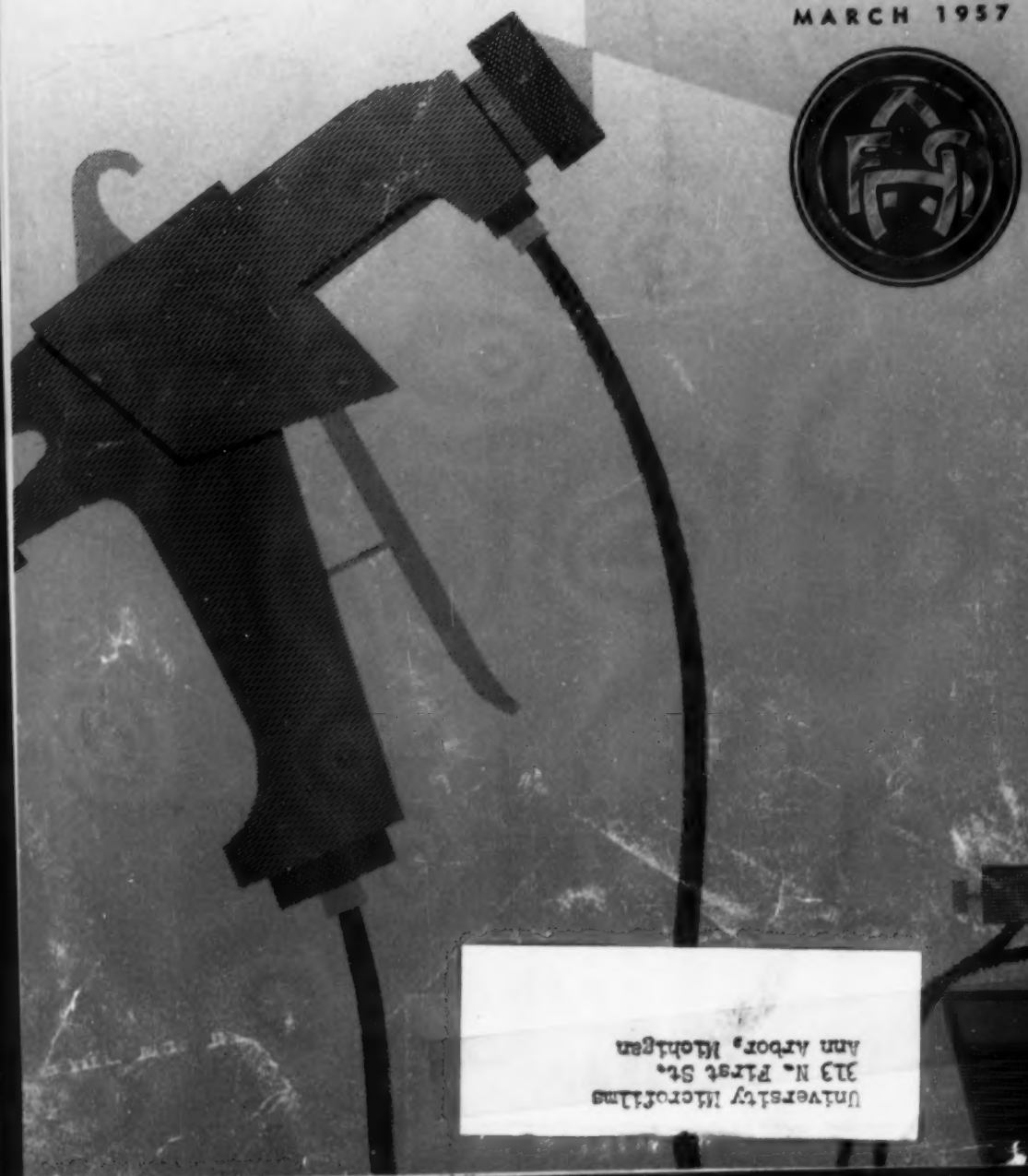
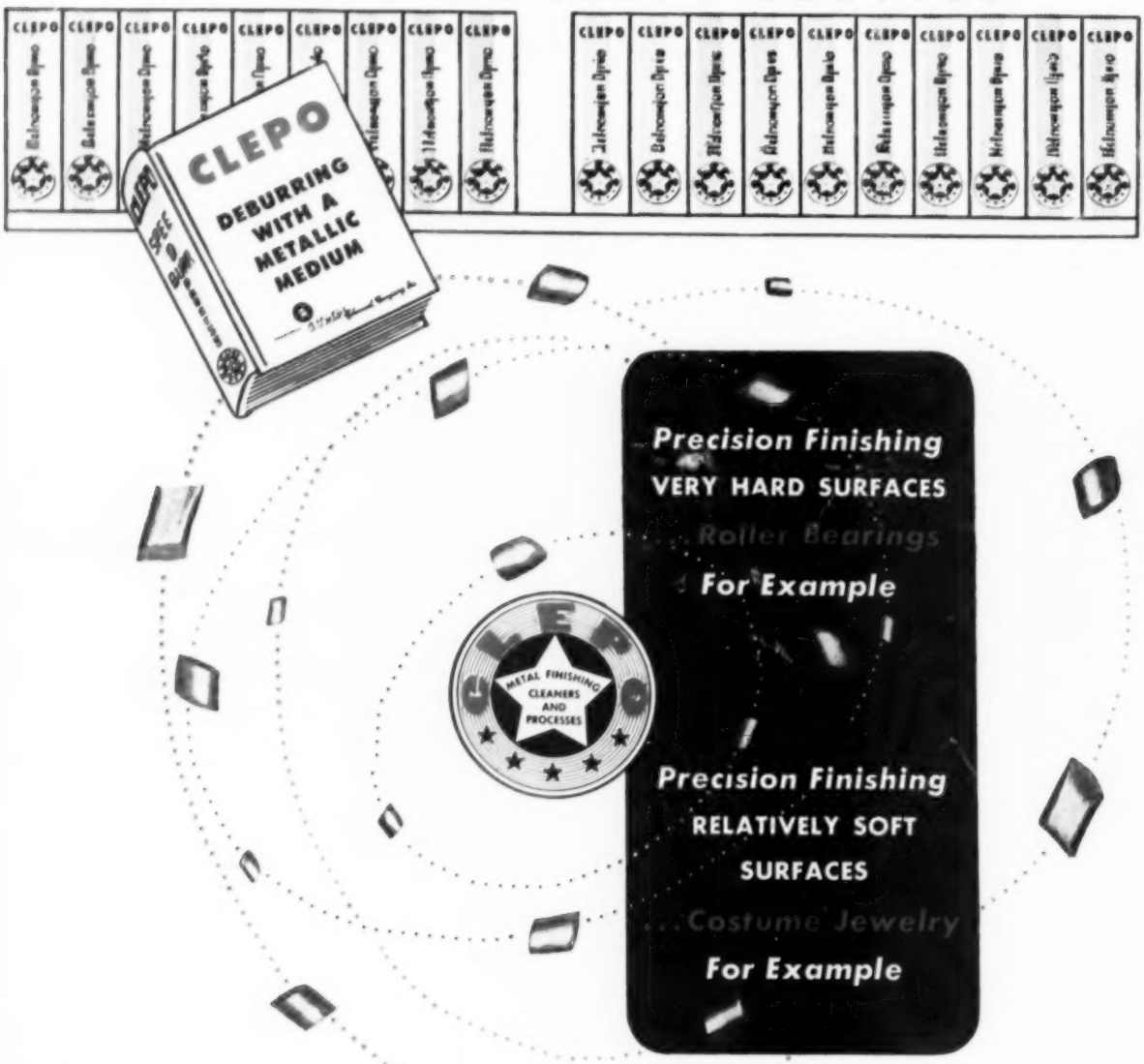
plating

JOURNAL OF THE AMERICAN ELECTROPLATERS' SOCIETY

MARCH 1957



University Microfilms
313 N. First St.
Ann Arbor, Michigan



The CLEPO Spee-D-Burr Process can do both. It's exceptionally versatile. Using uniformly-sized zinc barrel-shaped slugs, this process produces a rather unique tumbling action. Contacts are surface to surface rather than point or edge to surface as is usually the case with non-metallic deburring media. Tendency to scratch, gouge or otherwise mar the surface is eliminated. Uniform high polish precision finishes can be obtained over a wide range of metal hardness — in one operation where the steels are concerned; followed by a ball burnishing operation on the non-ferrous metals.

Spee-D-Burrs come in three sizes: ⅛, ¼, ⅜ inches. You select the size that will not jam in slots or recesses.

The next time our Field Service man calls ask him to show you samples of these Spee-D-Burrs and to tell you more about this CLEPO Process. It may offer the solution to your barrel finishing problem. And don't forget he has other tumbling processes and materials as well as cleaners, strippers, etc., that might fit into other phases of your operations.

CLEPO SERVICE is based on more than twenty-five years of close contact with finishing plant problems. Many different formulations are available for cleaning, stripping, burnishing, deburring, and for producing special finishes.

FREDERICK

3-FG2

GUMM *Chemical Company Inc.*

538 FOREST STREET, KEARNY, N. J.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 300.

ENTHONE
Emulsion Cleaner
75

Removes Oil and Solid Dirt in SECONDS!

SIMPLE OPERATION . . . MANY ADVANTAGES

DIP . . . steel parts to be cleaned in Emulsion Cleaner 75 for only *15 seconds*. This simple immersion is done at room temperature (no heating facilities required) and with no irritation of the operator's nose, throat or skin.

RINSE . . . in plain water.

DONE . . . and done *thoroughly* . . . in seconds! All heavy oil films and solid dirt have been removed from every corner and crevice . . . from slots, tapped holes and sculptured patterns.

INSURE . . . smoother, brighter, more adherent electrodeposits . . . and a reduction in pitting.

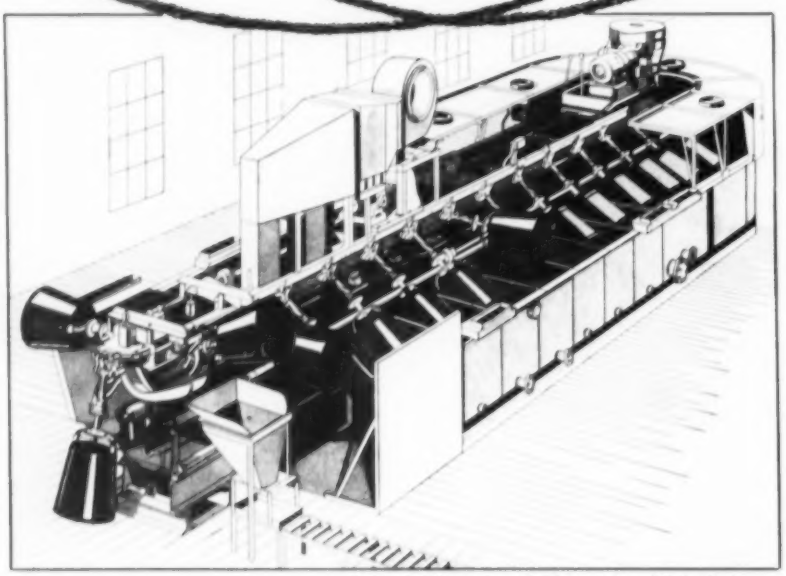
WRITE FOR FREE LITERATURE ON THIS SIMPLE, FAST, SAFE . . . AND ECONOMICAL . . . METHOD OF CLEANING METALS.

Service Representatives and Stock Points in Principal Cities of U.S.A. and Canada, Brazil, England, France, Sweden, and Germany

ENTHONE
INCORPORATED

442 ELM STREET, NEW HAVEN 11, CONNECTICUT
Metal Finishing Processes • Electroplating Chemicals

Barrel Plating by Stevens Really Cuts Costs



End View of Stevens Super "E" Automatic Barrel Plating Machine.

Since Stevens first introduced the Automatic Barrel machine scores of industries have enjoyed these operational advantages. Check them against your present operations.

MINIMUM LABOR REQUIRED — In most cases, one unskilled employee can operate the machine.

HANDLES THE COMPLETE CYCLE — Including cleaning, pickling, chromate treatments, plating, bright dip and drying.

COMPLETELY AUTOMATIC — No barrel lids to fasten and unfasten during automatic loading and unloading.

BETTER HANDLING — No mixing of parts. Becomes a part of a straight line production system.

NO HEALTH HAZARD — Occupational health hazards eliminated with ventilation of equipment.

UNIFORMITY OF PLATE — Accurate plating cycles timed to meet your requirements.

FITS ANY PLANT LOCATION — Does not need special buildings—Can be moved at any time. Low head room.

DEPENDABLE — Scores of machines in use. Machine design and construction constantly improved.

LOW INITIAL COSTS — For average operation lowest initial machine costs.

LOW MAINTENANCE COSTS — Proven over years of use and in varied operations.

FREDERIC B. STEVENS INCORPORATED
YOUR METAL FINISHING SUPERMARKET
DETROIT 16, MICHIGAN

Let a Stevens Sales Engineer show you how you can cut costs in your plating operation with a Stevens Automatic Barrel. Write us direct. Frederic B. Stevens, Inc., 1816-18th Street, Detroit 16, Michigan.

METAL FINISHING EQUIPMENT AND SUPPLIES, FROM CASTINGS OR STAMPINGS TO FINISHED PRODUCT

BRANCHES:

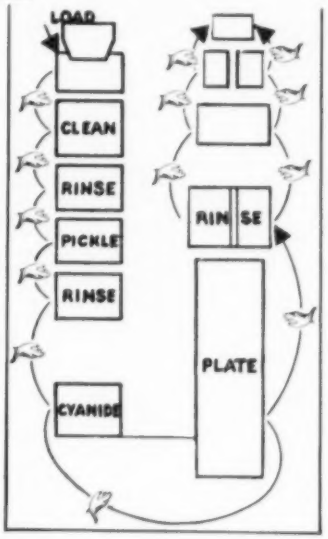
Buffalo • Indianapolis • New Haven

Offices in Principal Cities

HOW AUTOMATIC BARREL PLATING CAN REDUCE YOUR HANDLING AND BURDEN COSTS—

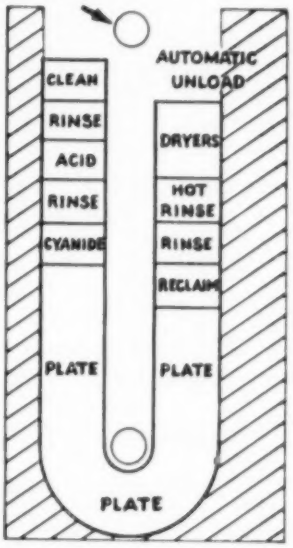
Compare this

Conventional Horizontal Barrel Line



With this

Stevens Automatic Barrel Installation



Production from *both* installations is the same.

Notice how many more handling steps (indicated by the illustrated hands) and manual load-unload operations (indicated by the arrows) are required for the manual set-up.

Notice, too, how much floor space (indicated by shaded area) is saved with a Stevens automatic installation. No manual operations required with automatic load and unload.

An Educational Society for the Advancement of the Science of Electroplating, the Finishing of Metals and Allied Arts

John P. Nichols
Chairman, Editorial Board and Managing Editor

Rodney Leeds
Editor

Ann Panico Freda
Editorial Assistant

Dr. Abner Brenner **Arthur W. Logozzo**
John B. Capuano **Howard J. McAleer**
Phillip M. Coady **Robert D. Miller**
S. Lewis Doughty **Fremont L. Scott**
Dr. Russel E. Harr **William M. Tucker**
Dr. Harold J. Wiesner
Editorial Board

Francis R. Murphy
Production Manager

H. A. Johnston
Acting Advertising Manager

Lee F. O'Connell
111 N. LaCienega Blvd., Beverly Hills, Calif., OLympia 2-1313

William Ayres
Lee F. O'Connell Co.
233 Sansome St., San Francisco 4, Calif. YUkon 6-2981
Western Advertising Representatives

SOCIETY of BUSINESS MAGAZINE EDITORS

Cover designed by James Ciuffo

plating

Journal of the American Electroplaters' Society

March 1957 **Vol. 44, No. 3**

Editorial:
The AES and Organic Coatings 231

Painting and the Plater 260
by Michael Borushko

The Development of Plastisol Systems for the Metal Coating Industry 263
by R. F. McTague

New Developments in the Field of Organic Coatings ... 266
by B. F. Ames

Organic Coatings in Metal Finishing 269
by L. J. Nowacki

Color Difference Specifications 274
by Henry Hemmendinger and Hugh R. Davidson

Selecting and Testing Finishing Materials 279
by H. P. Wertman

Hardness Tester for Non-Conductive Organic Coatings . 281

Milwaukee Deals With the Allied Arts 306
by Leslie Dively

AES Branch Directory	339	Future Meetings	339
AES Directory	339	Industry News	242
AES Membership Report	319	Industry News Briefs	244
AES News	316	Index to Advertisers	340
Article References	308	Intersociety News	310
Books	252	Mailbox	252
Branch News	322	Patent Abstracts	298
Classified Advertisements	320	Personals	248
Equipment and Supplies	254	Trade Literature	292

Published by the American Electroplaters' Society, Incorporated, 445 Broad Street, Newark 2, N. J. Phone: HUmboldt 2-3400. Yearly subscription for Members $2.00. Nonmembers U. S. and Canada $5.00, 65c a copy. Foreign, $8.00 a year, $1.00 a copy.

Copyright, 1957, by the American Electroplaters' Society, Incorporated.

PLATING is abstracted regularly in Chemical Abstracts, Metals Review, Metallurgical Abstracts, Engineering Index, Technical Data Digest, and Bulletin Analytique.

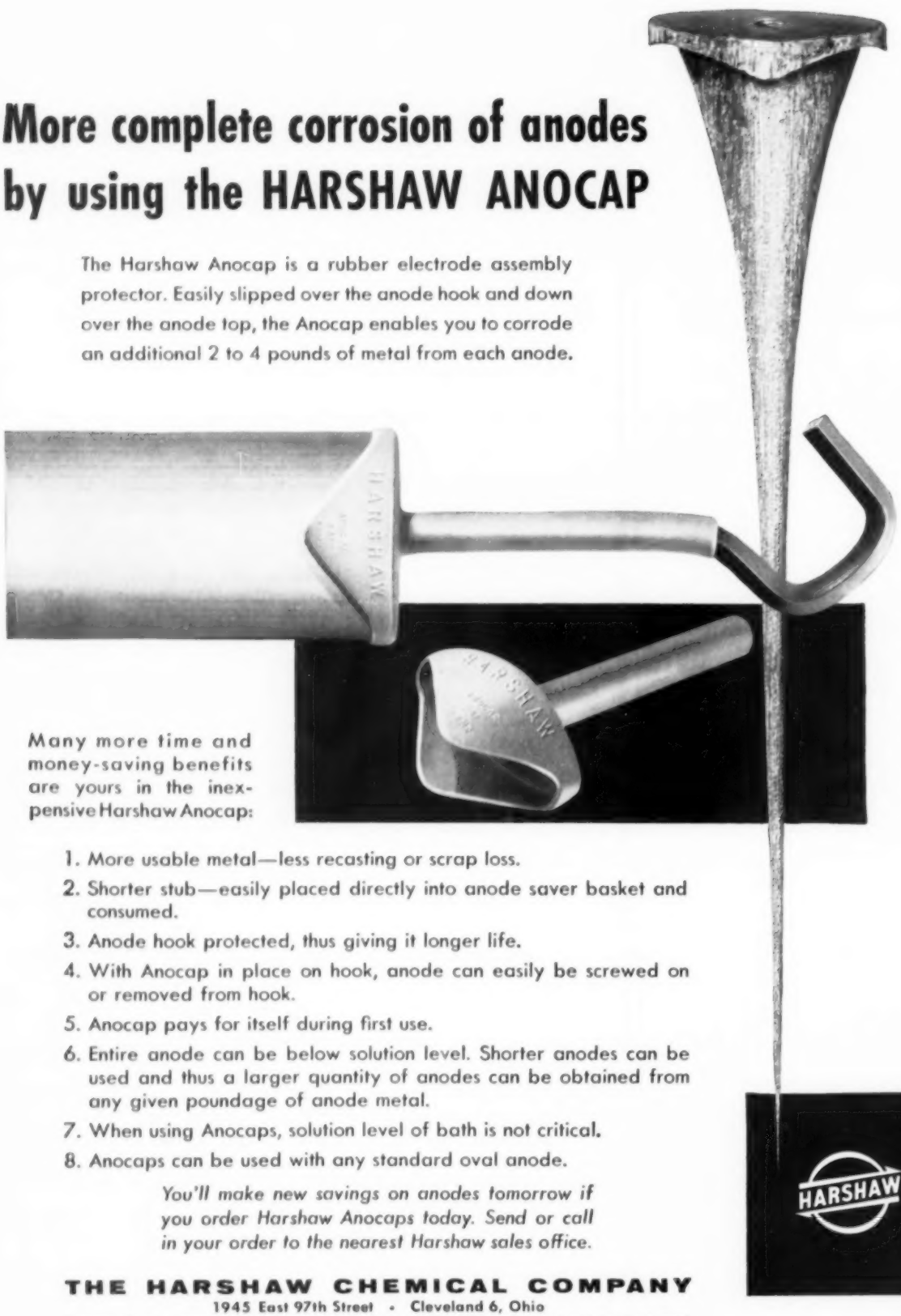
Statements of fact and of opinion given in articles and papers in PLATING are those of the contributors. The American Electroplaters' Society assumes no responsibility for them.

Articles appearing in this publication may not be reproduced in full or in part without express permission of the Managing Editor.

Published monthly at 5800 N. Marvine St., Philadelphia 41, Pa. Entered as second class matter July 1, 1946, at the Post Office at Philadelphia, Pa., under Act of August 24, 1916.

More complete corrosion of anodes by using the HARSHAW ANOCAP

The Harshaw Anocap is a rubber electrode assembly protector. Easily slipped over the anode hook and down over the anode top, the Anocap enables you to corrode an additional 2 to 4 pounds of metal from each anode.



Many more time and money-saving benefits are yours in the inexpensive Harshaw Anocap:

1. More usable metal—less recasting or scrap loss.
2. Shorter stub—easily placed directly into anode saver basket and consumed.
3. Anode hook protected, thus giving it longer life.
4. With Anocap in place on hook, anode can easily be screwed on or removed from hook.
5. Anocap pays for itself during first use.
6. Entire anode can be below solution level. Shorter anodes can be used and thus a larger quantity of anodes can be obtained from any given poundage of anode metal.
7. When using Anocaps, solution level of bath is not critical.
8. Anocaps can be used with any standard oval anode.

You'll make new savings on anodes tomorrow if you order Harshaw Anocaps today. Send or call in your order to the nearest Harshaw sales office.

THE HARSHAW CHEMICAL COMPANY

1945 East 97th Street • Cleveland 6, Ohio

Chicago 32, Ill. • Cincinnati 13, Ohio • Cleveland 6, Ohio • Houston 11, Texas • Los Angeles 22, Calif.
Detroit 28, Mich. • Philadelphia 48, Penna. • Pittsburgh 22, Penna. • Hastings-On-Hudson 6, N. Y.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 303.

EDITORIAL

The AES and Organic Coatings

"NOW if that recessed area were blacked in, the chromeplated portion would be high-lighted and enhance the appearance of the part." Such an innocent bit of conversation between two designers can set off a chain reaction that will reach all the way from the plater who makes the part, to the customer who purchases the finished product. What service is to be expected of the painted surface? Will a single coat suffice or should a prime coat be applied under the color?

These questions, and many more, will be asked by all who have a part in producing the product.

For many years, all platers have been using organic finishes in various forms and have taken them for granted as just part of the job. Only when stylists started adding similar coatings to the plated surfaces did they realize that here was a subject requiring as much thought and study as plating itself.

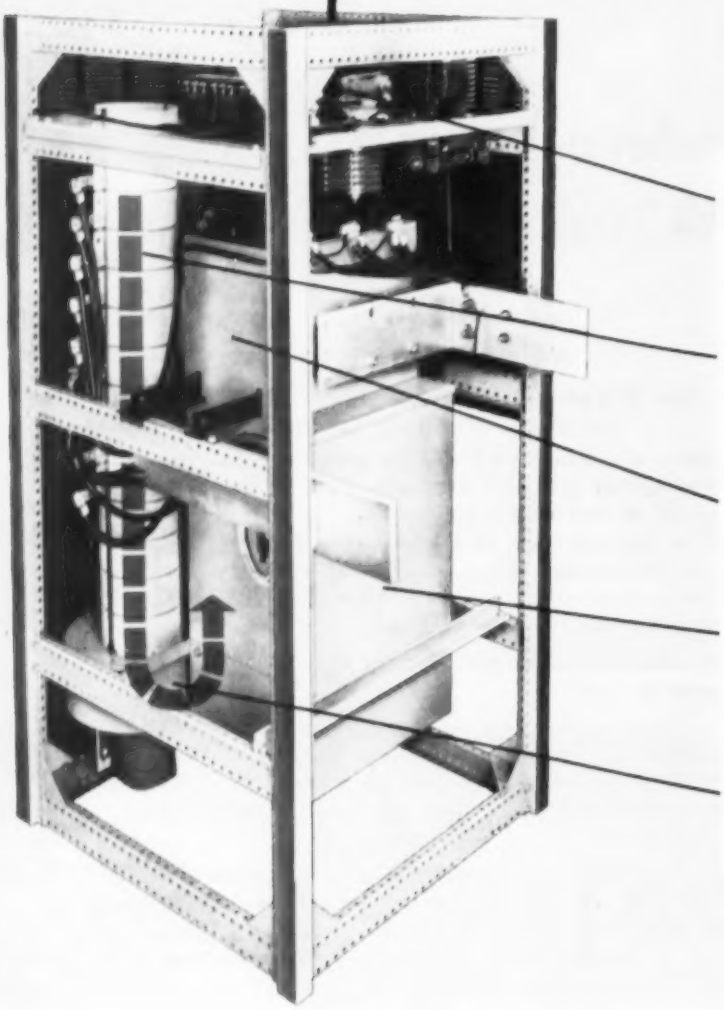
Today, everyone thinks of rack coatings and stop-offs as part of the job of plating and would not think of operating without them. The same thought goes with tank linings and protective coatings. These essentials developed by organic coating research have become as much a part of the plater's everyday life as plating itself.

PLATING, in recent years, has given as much as ten per cent of its volume of papers to articles on organic finishing, but never before has it devoted an entire issue to this subject. The increasing importance of this phase of the finishing field and the fact that most of the AES membership has already been, or will soon be, asked to make its acquaintance, has caused all of us to become more aware of the object of our Society, which, in part, is *An Educational Society for the Advancement of the Science of Electroplating, the Finishing of Metals and Allied Arts.*

This issue, focused upon organic coating in relationship to the electroplater and the metal finisher, is another AES strike at that target.

Ralph D. Wysong

Chairman
Organic Finishing Committee



Automatic voltage control contains no moving parts or electronic tubes.

This tube contains time-proven General Electric germanium cells, each hermetically sealed in stainless-steel-ceramic enclosure for maximum corrosion resistance.

Transformer, protected by double-impregnation with alkyd-resin finish.

Reactor provides instant, stepless control plus built-in short-circuit protection.

Powerful blowers supply high-velocity cooling air blast (red line) past cells, through reactor and transformer.

General Electric announces a

TO: GENERAL ELECTRIC COMPANY
Section 463-15, Schenectady 5, N. Y.

Gentlemen:
Please send me bulletin GED-2934, "General Electric Automatic Germanium Plating Rectifier."

NAME_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE_____ STATE_____

Progress Is Our Most Important Product

GENERAL ELECTRIC

RELEASE THIS MAN FOR MORE PRODUCTIVE WORK . . . no further need for him to continually correct output in order to get high-quality work. Just set it and forget it. This unit corrects faster, more accurately than the most-skilled operator. You get uniform power for most profitable plating.

NEW line of low-priced automatic germanium plating rectifiers

Examples: 9-volt/1500-amp, $1890; 12-volt/1000-amp, $1750

COMPLETE with remote automatic voltage control

Here's the biggest advance in plating rectifier technology since the introduction of germanium: *automatic control at low prices*!

With automatic control, you simply set the output you want on the remote-control panel. This output is maintained automatically, regardless of changes in tank load or variations in a-c input voltage. The result is a uniform product from rack to rack—not too much deposition, which wastes valuable anode material, time, and labor; not too little deposition, resulting in costly rework.

The low price results from: (1) successful adaptation to plating equipment of a low-cost saturable reactor circuit, long recognized as the ideal control; and (2) the perfection of a new cooling technique which cools the germanium cells from *both* sides and force-cools the reactor and transformer for long life.

Ratings *are now being built* from 6-volt/750-amp to 250-volt/140,000-amp, air-cooled and water-cooled. Ask your General Electric plating equipment supplier for more information, or send in the coupon for bulletin. General Electric Co., Schenectady 5, N. Y.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 304.

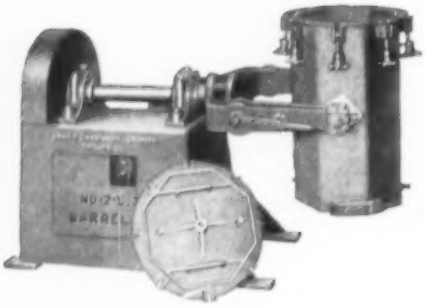
L'HOMMEDIEU
Everything for Plating and Polishing

Manufacturers of

"RELIANCE" PRODUCTS

— since 1898 —

The most complete line of electroplating and polishing equipment and supplies



TYPE L—DOUBLE ACTION BARREL FOR ABRASIVE TUMBLING OR BALL BURNISHING

The cylinder can be operated at an angle for producing a double tumbling action—thus producing a better and more uniform finish in a much shorter time.

Longer pieces finished more uniformly and without bending.

RELIANCE SELENIUM RECTIFIERS

Designed for all metal finishing operations.

High power factor and low ripple.

6 to 48 volts D.C.

Basic-self-contained or with Remote Control.

No. 18 VARIABLE SPEED POLISHING LATHE

Independent spindles—each with separate patented Variable Speed Drive and controls—ball-bearing throughout. Powered by two up to 15 H.P. motors. Adopted by leading manufacturers as standard equipment.

Write for descriptive literature and prices

Chas. F. L'Hommedieu & Sons Co.

MANUFACTURERS of

Plating and Polishing Machinery

Complete Plating Plants Furnished

Chas. B. Little Co.
Newark, N. J.

W. R. Shields Co.
Detroit, Mich.

Gen. Office and Factory:
4521 Ogden Ave.

CHICAGO

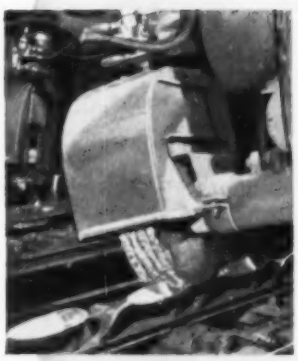
Branches:
Cleveland
and
Los Angeles

ALWAYS FINISHES FIRST

—and saves on compound—it's "metered"!

Liquimatic®

the perfect liquid compound for all metal finishing



How much of the compound in your buffing room is wasted... in the nubbin pile, or in "over-heading" buffs? There's a way to "meter" the compound you use—the Liquimatic way. An electrically timed system in the Liquimatic Process feeds the exact amount of liquid compound for the exact cut you need. While compound is being saved, buffs are being saved too ... continual lubrication extends buff life up to 200%.

These two cost-saving advantages alone soon pay for a complete Liquimatic Application System. But there are still other ways Liquimatic will help you cut costs. No hand application, and no changing of bars will effect substantial down-time savings for you... and Liquimatic's ease of cleaning means even further economies. Now—when production must be upped, and costs lowered — profit from Liquimatic—over and over again.

Check the other features of Liquimatic ... then write today for your free copy of Liquimatic's big, new folder that tells the whole cost-saving story of Liquimatic in *your* buffing room.

These additional Liquimatic features mean real savings in terms of time, money, safety—

- longer buff life
- completely automatic
- fast cutting
- easy cleaning
- non-settling
- high flash point
- long storage life
- sprayable viscosity
- adhesive slow-wearing buff face

Liquimatic ...

gives more buff mileage

PLATEMANSHIP

Your H-VW-M combination—of the most modern testing and development laboratory—of over 80 years experience in every phase of plating and polishing—of a complete equipment, process and supply line for every need.

HANSON-VAN WINKLE-MUNNING COMPANY

Main Office and Plant, Matawan, New Jersey

J. C. Miller Division, Main Office and Plant, Grand Rapids, Mich.

SALES OFFICES: Anderson (Ind.) • Baltimore • Beloit (Wisc.) • Boston Bridgeport • Chicago • Cleveland • Dayton • Detroit • Grand Rapids • Los Angeles • Louisville • Matawan • Milwaukee New York • Philadelphia • Pittsburgh • Plainfield • Rochester St. Louis • San Francisco • Springfield (Mass.) • Utica Wallingford (Conn.)

H-VW-M

INDUSTRY'S WORKSHOP FOR THE FINEST IN PLATING AND POLISHING PROCESSES • EQUIPMENT • SUPPLIES

SPEARHEADS OF THE REVOLUTION! IN POWER CONVERSION

Here and abroad, leading chemical and aluminum producers, as well as manufacturers of rectifier equipment, are swinging to International Rectifier Corporation germanium junctions. Why? High efficiency (up to 97%)... smaller unit size... and increased reliability! These revolutionary junctions are in the better power rectifier units of today. Are they in yours?

Write for complete information and engineering data on this new concept in power rectifier junctions.

IN CANADA: ATLAS RADIO CORP., LTD., 50 WINGOLD AVE. W., TORONTO, ONTARIO. RU 1-6174

1 LIQUID-COOLED GERMANIUM JUNCTION, rated at 670 amperes, 26 to 66 volts. Housed in high-conductivity copper, cast around a steel coil. Water, oil or other accepted coolants may be used. Size: Approximately 3⅛"x4"x4½".

2 AIR-COOLED GERMANIUM JUNCTION rated at 333 amperes, 26 to 66 volts . . . one of a new series featuring cast aluminum housing—an exclusive design by International which provides extremely high resistance to corrosive atmospheres. 500 ampere unit available . . . slightly larger size.

3 FAN-COOLED GERMANIUM JUNCTION 150 amperes, 66 volts, half-wave. Thousands of these highly efficient (up to 97%) units, featuring this exclusive thermodynamic design, are serving American industry today.

A WORLD OF DIFFERENCE • THROUGH RESEARCH •

International Rectifier

CORPORATION

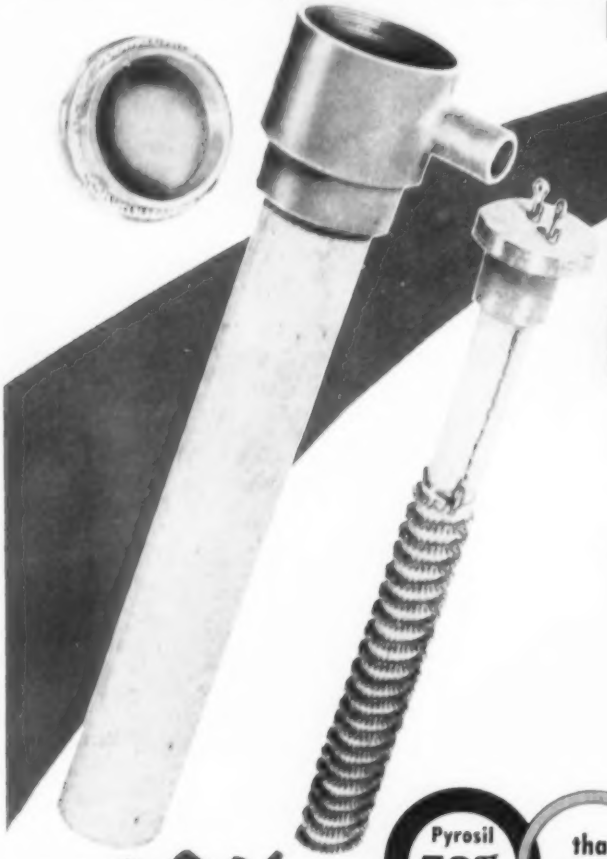
INDICATE A REP.

EXECUTIVE OFFICES: EL SEGUNDO, CALIFORNIA • PHONE OREGON 8-6281

NEW YORK: 132 E. 70TH ST., TRAFALGAR 9-3330 • CHICAGO: 205 W. WACKER DR. FRANKLIN 2-3888

UP TO 60% SAVINGS ON THE -

New Improved PYROSIL FUSED SILICA



Replaceable Element IMMERSION HEATERS*

*patent pending

"They Breathe"

FOR HEATING . . .

- CHEMICALS
- DEGREASERS
- OILS
- PLASTICS
- DYE STUFFS
- ACIDS*

*Except Hydrofluoric and Phosphoric.

DO NOT USE IN ALKALIS

Pyrosil 50% Thicker than Others!

LOOK AT THESE FEATURES

- Eliminates explosions by constant breathing through the junction box lead-in conduit preventing pressure 'build-up' inside the shell.
- Only the element needs replacement when there is a 'burn-out'.
- Indefinite use of the quartz shell and acid resistant boot and cap.
- 50% thicker shell to withstand greater mechanical shock.

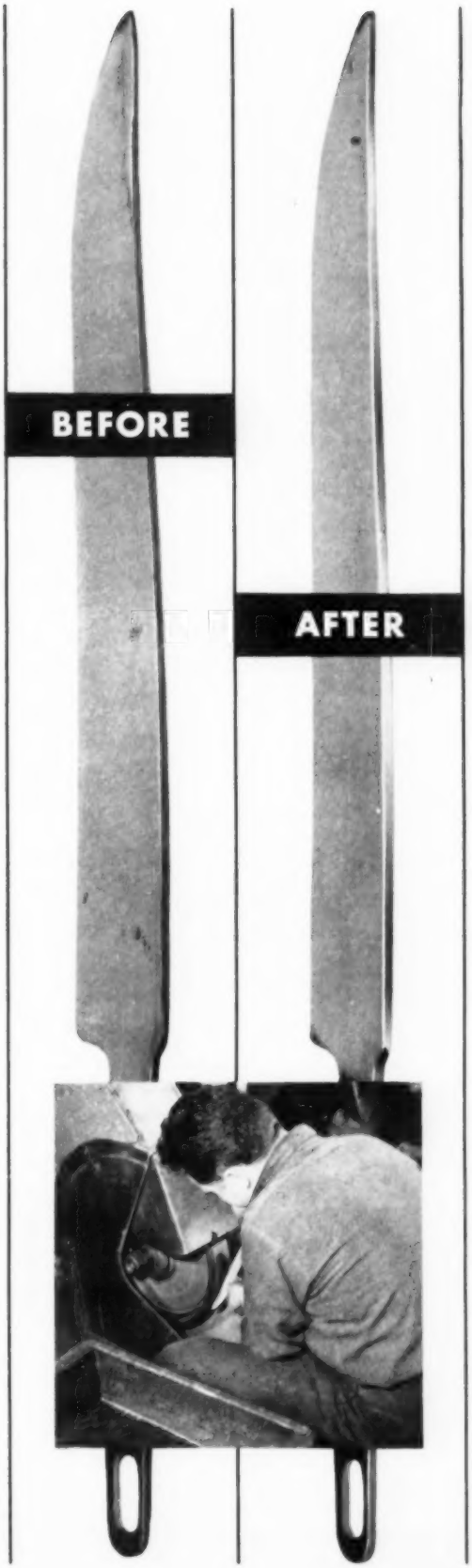
4 INTERCHANGEABLE SIZES FOR DIFFERENT KILOWATT RANGES

Send for Our Catalog . . TODAY!

PYROSIL, INCORPORATED

DEPARTMENT P-357

CUYAHOGA FALLS OHIO



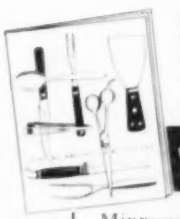
HOW WOULD YOU SOLVE IT?

1. PRODUCTION PROBLEM: To cut grinding time on the backside of forged steel carving knives before plating. H. Boker Company was using grinding wheels and setup wheels in a two-step operation that was slow and left an unsatisfactory pre-plating finish.

2. SOLUTION: A 3M Representative suggested that this Maplewood, N. J. firm switch to the 3M Backstand Method using Grit #150 Three-M-ite Resinite Cloth Belts. Results: knife blades are now ground in *one* operation with consistently superior finishes for plating.

3M Abrasive Belts can help you cut costs and increase production of cutlery, hand tools or hardware products, too. Call your 3M Representative today for full facts, or send coupon below.

3M ABRASIVES



Made in U. S. A. by MINNESOTA MINING AND MFG. CO. General Offices: St. Paul 6, Minn. In Canada: P. O. Box 757, London, Ontario. Export Sales Office: 99 Park Avenue, New York City.

WANT MORE INFORMATION?

Minnesota Mining and Manufacturing Co.
Dept. DT-37, St. Paul 6, Minnesota
Please send me FREE BOOKLET(s) checked:

- ☐ "Grinding and Polishing Cutlery"
- ☐ "Grinding and Polishing Hand Tools"
- ☐ "Grinding and Polishing Hardware"
- ☐ I'd like to talk with a 3M Representative.

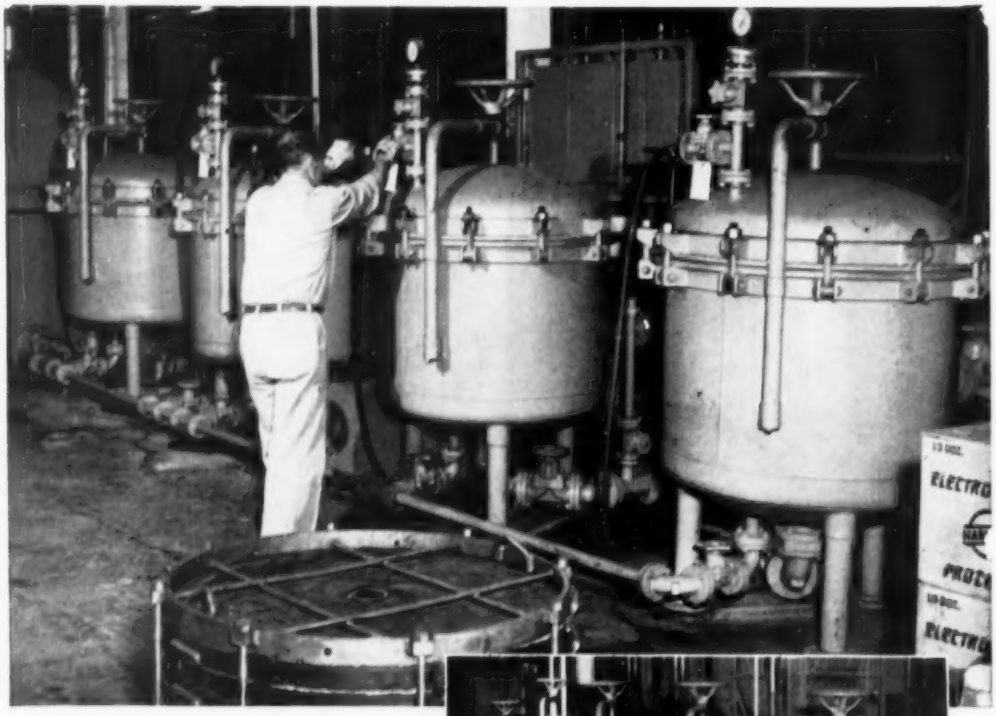
NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 309.



High Flow Rates Low Servicing Cost *give* Low Cost Filtering of Plating Solutions—

2,208,000 gals. of bright nickel solution are filtered in these four Sparkler Horizontal Plate filters (top illust.) through a continuous 5 day cycle with 24 hour operation. Filters are cleaned once a week by lifting out the plate cartridge and replacing it with a fresh dressed set of plates. Only a few minutes is required for this operation.

In the same plating plant, (lower illust.) the four large Sparkler filters are used to filter suspended matter from Ronal bright copper solution. These filters have a flow capacity of 4800 G.P.H. each. The small, far end unit filters suspended matter from a copper strike bath. Capacity 2,100 G.P.H.

On occasion these filters are employed for filtering out activated carbon and lime from copper solution and activated carbon and nickel carbonates from nickel solution.

Plating Plant Engineers will find Sparkler filtration engineers most co-operative to work with on installations of any size.
Write Eric Anderson

SPARKLER
horizontal plate
FILTERS
(the original horizontal plate filter)

SPARKLER MANUFACTURING CO. MUNDELEIN, ILL.
Sparkler International Ltd.
Manufacturing plants in Canada, Holland, Italy, and Australia.

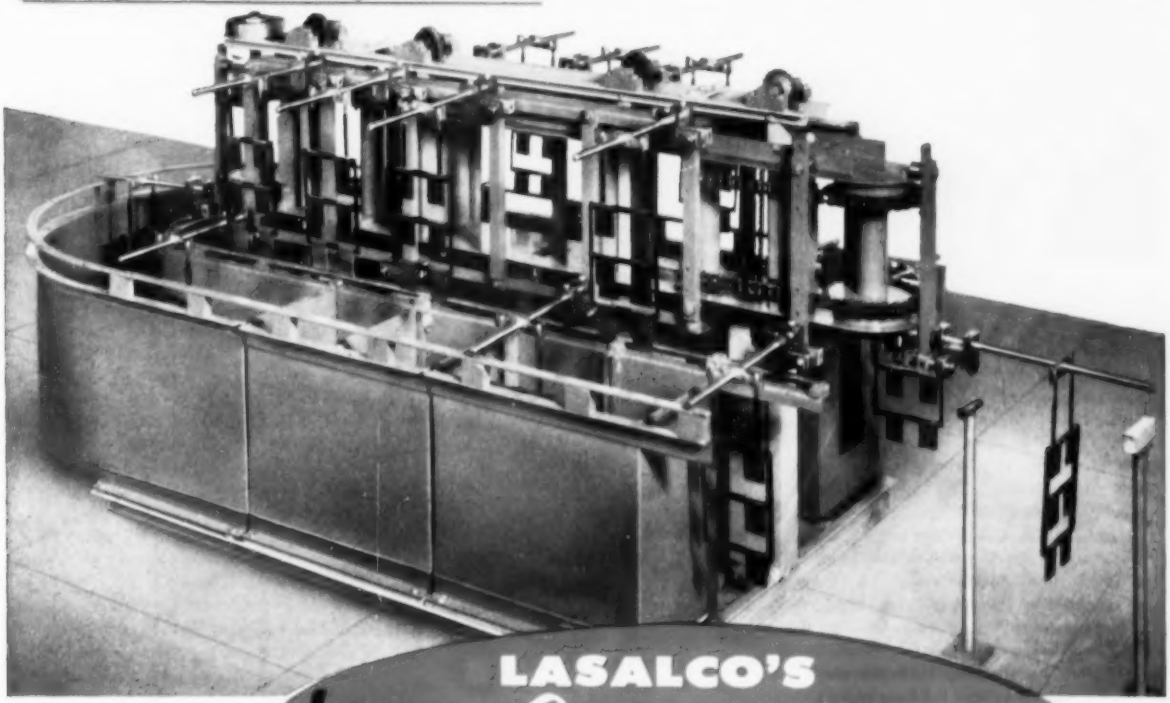
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

Mail this today!

Get complete information on the most versatile of all fully automatic plating and anodizing machines.

Lasalco, Inc.
2820 LaSalle St.
St. Louis 4, Missouri
Send brochure on new fully automatic Cycleflex.

Company .....
Street Address .....
City ..... Zone ..... State .....
Signed .....



New! LASALCO'S Cycleflex

- Cycle changing requires no costly overhaul or rebuilding. Only the positions of pick-up heads need be moved, plus minor tank partition changes.
- New, simple electro-mechanical control and safety device eliminates all possibility of conveyor failure . . makes it impossible to push racks into side of tank . . . prevents load from dropping if power fails during work transfer.
- Unusually low headroom required because no elevating mechanism operates above rack carrier.
- Self-cleaning heavy duty contacts have positive 3-point connection . . . need practically no attention.
- Easily removable rack carriers leave tank surfaces clear . . . an advantage in servicing and in manual plating of large pieces.
- Automatic loading and unloading of parts from standard double-spine racks is available . . . parts can be automatically unloaded while racks stay on machine.

Hydraulic operation, standard; pneumatic operation, optional.

Write For Brochure

LASALCO, INC.

HOME OFFICE: 2820 LaSalle St. • St. Louis 4, Mo. • PRospect 1-2990
IN TEXAS: 1113 Perry Road • Irving (Dallas), Texas • BLackburn 3-4921

INDUSTRY NEWS

Morris Messing

Bart-Messing and Sel-Rex Merge—The firms of Bart-Messing and Sel-Rex Corporations, both of Newark, N. J., merged on January 1, 1957.

The older of the two companies, Bart-Messing has manufactured and distributed power rectifiers, filters and metal finishing equipment and supplies for nearly fifteen years. The Sel-Rex Corp. has been prominent in the precious metals processes manufacturing field since its inception as Sel-Rex Precious Metals, Inc., five years ago. As the latter company grew, its product line expanded to include a wide range of non-precious metals items and electroplating processes. To avoid the possible misapprehension that the company was active in this field exclusively, "precious metals" was dropped from the corporate name, last year.

The business conducted by each of the companies individually will hereafter be carried on by separate divisions of the new Sel-Rex Corp.: Precious Metals Division, under the direction of E. C. Rinker, vice president, will handle the manufacture and marketing of precious metals salts, solutions and electroplating processes; Rectifier Division, headed by E. B. Redlhammer, vice president, will manufacture and market germanium, silicon and selenium power rectifiers, liquid clarification filters, and an automatic, portable electroplating machine known as the Jet Plater; Chemical Division, under the personal supervision of Morris M. Messing, president, will cater exclusively to the metal finishing and electroplating industries.

Executive offices, as well as rectifier and filter manufacturing facilities, have been established at 155 Manchester Place in Newark, N. J. Plans are currently being formulated for the centralization of the entire manufacturing and precious metals laboratory facilities in a new building which is to encompass approximately 40,000 sq ft.

Pennsalt Appoints Southeastern Distributor—The F. H. Ross Co. of Charlotte, N. C. has been appointed distributor for Pennsalt Chemicals' metal processing products. John M. Davidson, sales manager of the Pennsalt metal processing products department, announced that the Ross Co. will be the exclusive distributor of Pennsalt metal cleaners, Fosbond coatings and Fos Cold-Forming lubricants in the seven southeastern states of North and South Carolina, Tennessee, Georgia, Mississippi, Alabama and Florida.

Ross's new metal finishing department is under the direction of James H. Ross.

Cooper M. Schley is Pennsalt's direct metal processing representative in the area. His headquarters are in Birmingham, Ala.

Wagner Bros. Adds Electroplating Chemicals—Wagner Brothers, Inc., Detroit manufacturers of plating automation, equipment and supplies has entered the plating chemical processing field. Joe Wagner, president, states, "Wagner Brothers, Inc., has planned for a number of years to process a complete group of electroplating chemicals to round out our established line of automatic plating machines, rectifiers, tanks, anodes and related equipment and supplies."

The following processes are compounded: Iso-Brite copper, white brass, cadmium, and zinc, Iso-Lok chromate finishes, Wabrite nickel and Krome-on, the chromic-acid mist-inhibiting aid to plating throwing power introduced a year ago. Also introduced recently is their line of Benchmark metal cleaners including general all purpose soak cleaners, electrolytic cleaners for zinc base die castings, brass and copper and an anodic high detergency cleaner for removing smut from steel; others include electrolytic and soak cleaners for buffed copper, ferrous metals, aluminum and alloys.

Atlas Building New Technical Center—Atlas Powder Co. has broken ground for a $3,000,000 Technical Center which will enable the company to intensify its long-range basic research program, as well as to expand its technical service to the electroplating industry.

The new center will be located adjacent to the company's general offices in a suburban area near Wilmington, Del. It is scheduled for completion by the end of this year.

Atlas also operates the Reynolds Experimental Laboratory for explosives research near Tamaqua, Pa.; the Darco Experimental Laboratory at Marshall, Texas, for research on activated carbons; and the Aquaness Department laboratory in Houston, Texas, for research on chemicals for the petroleum industry.

Battelle Elects Board Members—Dr. Zay Jeffries, noted metals scientist and retired vice president of the General Electric Co., has been re-elected chairman of the board of trustees of Battelle Institute, Columbus, Ohio.

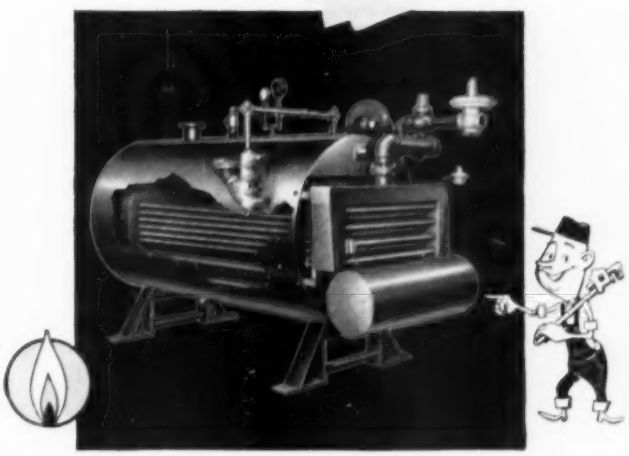
Along with Dr. Jeffries, seven other officials were elected at the board's annual meeting which closed out one of the most expansive 12-month periods in Battelle Institute's 27-year history.

In addition to election of officers, the board reviewed plans for two previously approved buildings to be constructed at its Columbus site, authorized purchase of additional land near the Battelle nuclear research center, planned extension of an educational program set up for Battelle staff members, and acted to broaden the management responsibilities of Battelle officers.

MacDermid Expands Ferndale Plant—To enlarge product research and development facilities and to meet the steadily increasing demand for metal finishing chemicals and compounds, MacDermid Incorporated, Waterbury, Conn., recently expanded plant facilities in Ferndale, Mich. Laboratory, office space and plant capacity have been doubled by the 9000 sq ft addition costing more than $80,000. New production and materials handling equipment have been added to increase manufacturing facilities.

Buy a Boiler You Can Understand

You don't need to be an Einstein or an atomic scientist to understand a Sellers Immersion Steam Boiler. The advantages of the Sellers immersion firing principle are apparent because it is based on practical engineering and common sense. Every pound of metal in a Sellers is strictly functional. Every tube and turn is designed and located for maximum efficiency and safety, for steam production at lowest cost!



IN A SELLERS:

1. **Firing tubes are completely submerged. All the heat goes directly into the water. Maximum heat transfer. No water line corrosion.**
2. **Water surface area is nearly three times that of a conventional boiler of comparable capacity.**
3. **There is no separate enclosed combustion chamber. No explosion hazard, no brick linings to replace, no carbon traps.**
4. **Expansion and contraction of firing tubes effectively combats scale.**

Sellers Immersion Steam Boilers are available in twelve sizes to meet all standard requirements. All are built to A.S.M.E. Power Codes. It will pay you to get the complete Sellers story. Write for bulletin No. 1206C-P-3 today.

Sellers ENGINEERING CO.

4876 N. CLARK STREET CHICAGO, ILL.

Blast Heaters • Immersion Automatic Water Heaters • Combustion Units • Industrial Gas Burners
Vertical Steam Boilers • Immersion Tank Heaters • Gas Combustion Equipment

Corrosion of Brass Plate

●

Brass plating of steel provides an economical substitute for solid brass. While it has been used for years the high price of solid brass makes it the more widely used today.

●

The corrosion resistance of brass plate is in direct ratio to the thickness. Much commercial plate is less than one-ten thousandth thick. Satisfactory corrosion usually requires more than two-ten thousandths. This can be economically attained in reasonable time by careful control of the brass solution.

●

Owing to the active nature of brass surfaces (both plate and solid) lacquer is necessary if the plate is to remain its original color. Poor lacquers are often used and poor corrosion resistance results. Baked lacquers (or enamels) are better and spraying is better than bulk methods. The resistance of the lacquers can be checked by salt spray or humidity tests. The difference is usually apparent in a short time.

●

To provide a bright finish a common procedure is to bright nickel plate the parts and apply a thin brass plate. This method is used both for rack work and barrels. It helps eliminate spotting out and provides a very bright surface. Lacquer again is very important to keep the finish from tarnishing.

●

Of course to get the best brass plate True Brite has the answers to solution control and maintenance. Get your copy of our technical bulletin now.

TRUE BRITE CHEMICAL PRODUCTS CO.
98 FALLS AVENUE OAKVILLE, CONN.

INDUSTRY NEWS BRIEFS

● A new process for making tin plate, developed by the British Iron and Steel Research Association, London, is described in *BISRA Survey*, 1956. It is a modification of the hot-dip method. Two baths are used with a tinning roll dipping into each. The steel strip passes between the rolls without going into either bath; the tin is conveyed to the strip by the rolls. Advantages of the new process are (1) the steel is in contact with molten tin for a much shorter time and only a little tin and iron alloy is formed; and (2) the coating thickness can be readily controlled by adjusting the speed of the rolls. Thus far, strip up to 2 in. wide has been experimentally plated. The Association is building a half-scale plant to plate strip up to 12 in. wide.

● With about 250 companies expected to use over 100,000 square feet of exhibit space, the 7th National Materials Handling Exposition, to be held at Convention Hall, Philadelphia, April 29 through May 3, is expected to exceed its predecessor by more than 15 per cent in size.

The show, the original one in its field, will emphasize systems of materials handling rather than any particular piece of equipment. Over 100 types of equipment will be demonstrated.

● Demand for cadmium in 1955 balanced supply, according to the report just released by the Bureau of Mines, United States Department of the Interior. Demand, based on apparent consumption was 10,689,000 lb, 44 per cent above that of 1954. New supply, consisting of metal production at domestic plants and imports of metal, was 10,681,000 lb, 9 per cent above that of 1954. Total stocks declined 26 per cent or 1,402,000 lb during the year.

Total stocks of metallic cadmium and cadmium contained in compounds declined approximately 1,269,000 and 133,000 pounds, 26 per cent each in 1955.

● The zinc industry is looking forward to an exceptionally good consuming year in 1957.

According to John L. Kimberley, executive vice president of the American Zinc Institute Inc., slab zinc consumption in 1957 may well exceed the record set in the industry's boom year of 1955 when total slab zinc consumed reached 1,078,968 tons.

Auto producers find that zinc die castings provide accurate, heavy duty and shock resistant parts at minimum cost consistent with high quality. In addition zinc die castings offer the automotive designer maximum flexibility in styling to meet the increased demand for streamlined contours and sparkling trim.

Low melting temperature, adaptability to intricate casting patterns, and the relative ease with which it can be plated for finishing, as well as its general all-around economy make zinc die castings a top choice for a host of products outside the automotive field.

● The newest giant exposition in the industrial field, the Design Engineering Show, has been scheduled for the New York Coliseum, May 20 to 23.

Held for the first time in Philadelphia last Spring, the show has skyrocketed to a size which places it among the five largest annual industrial expositions in the country. Ordinarily, several decades are required for a show to grow to such proportions.

Before this year, design engineers were required to attend a number of expositions to see the most recent developments in their field. Although a number of shows had design components and materials among their fringe exhibits, no single show was devoted completely to the engineers' needs.

Finishes, coatings and metallic materials will be exhibited.

Concurrently with the show, the machine design division of the American Society of Mechanical Engineers will sponsor a conference on innovations in the design engineering field.

● The stainless steel industry considers 1956 as the break-through period for the 200 series of stainless steels when a phenomenal 850 per cent production increase was noted over 1955, according to E. J. Hanley, president Allegheny Ludlum Steel Corporation. This means that 1956 will be remembered as the year when a substantial number of stainless fabricators learned to stretch scarce nickel supplies twice as far without sacrificing quality.

BALANCED QUALITY *

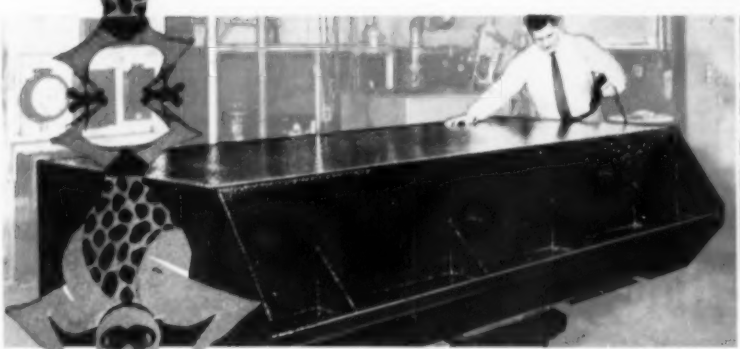
Keeps **MICCROSOL** on top

Developed originally as a coating for plating racks, Miccrosol E-1003 has all the desirable characteristics which make it an ideal coating for many other applications.

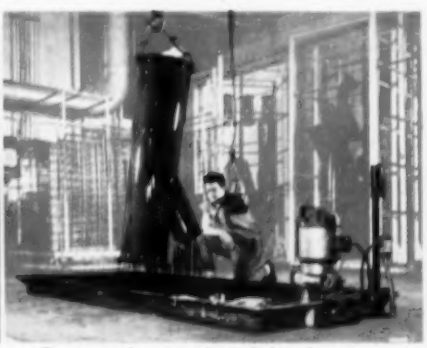
The chemical resistance of Miccrosol is unequalled in its field. Its toughness, abrasion resistance, resilience, and flexibility are unsurpassed. It's easy to apply in either a *dip* or *spray* formula. When necessary, it's easy to repair.

Year after year we build this quality into Miccrosol, improving it whenever possible and practicing every economy in its manufacture that does not compromise the excellence of the product.

This BALANCED QUALITY enables you to use Miccrosol *profitably* while assuring your customers of coating jobs that will prove superior in their performance.



Spark testing a large plating tank coated with Miccrosol Spray S-2003.



Coating a large section of duct by dipping in Miccrosol E-1003.

*Outstanding performance and value

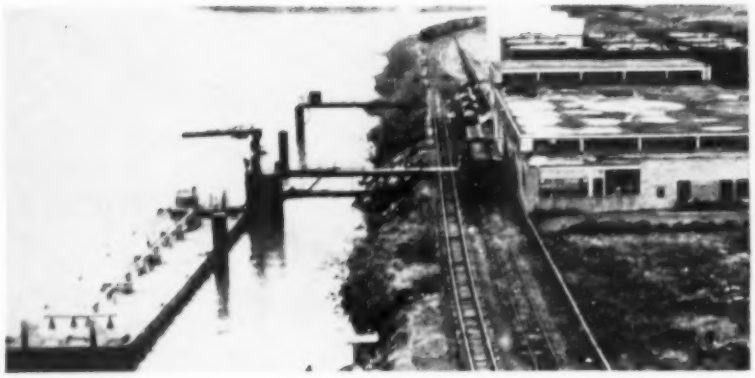
MICHIGAN CHROME *and Chemical Company*

8615 GRINNELL AVENUE • DETROIT 13, MICHIGAN

MICCAD Products — *Developed and manufactured by experienced platers and coaters*

FOR TANKS, DUCTS, AND OTHER EQUIPMENT

INDUSTRY NEWS



Canadian Subsidiary Added by Imperial Rack—To serve the expanding Canadian market, Imperial Rack Co. of Flint, Mich., has opened a new Canadian plant.

The new Canadian Imperial Rack Co. is located in a modern building on Oxford Street, East, in London, Ontario. The entire plant has been renovated so that all phases of rack manufacture can be handled. Their facilities include equipment for manufacture of plating and anodizing racks, even of large capacity now used in automation.

Bulk Terminal for Diamond Alkali Products—A new bulk terminal facility specially designed for handling perchlorethylene, a solvent widely used for industrial degreasing, has been put into operation by the McClintic-Gordon Co., McKees Rocks, Pa.

Operated for Diamond Alkali Company, Cleveland, Ohio, producers of basic chemicals, the new facility consists of a 225,000-gal storage tank, filtering and drying equipment, a 15,000-gal plastic-lined holding tank, drumming facilities, storage warehouse, and supporting docking and pumping facilities to accommodate barge shipments of perchlorethylene from Diamond's Deer Park Plant at Houston, Texas.

H&VW Complete New Wing—The $140,000 expansion of the warehousing and manufacturing facilities at the Etobicoke Plant of Canadian Hanson and Van Winkle Co., Ltd., has been completed.

Founded in 1911, Canadian Hanson and Van Winkle Co., Ltd., manufactures or handles the whole range of products and equipment used by the metal finishing industry.

The new wing built at the Etobicoke plant will give the company an additional 16,000 sq ft of warehousing and manufacturing space. It will allow the Toronto Plant at 15 Morrow Avenue to expand its office space and research facilities. The space for research will enable the company to expand the development and testing of new processes and new materials for the metal finishing industries. More room also will be available for customer service work.

Coatings Firm Joins Group—The G. S. Plastics Co., with new plant and offices at 15583 Brookpark Rd., Cleveland 11, Ohio, is the newest member of the group of associated firms including The General Supply Co., The G. S. Equipment Co. and The Singleton Co., serving the chemical processing, electroplating and manufacturing industries.

The new plant has equipment for coating unusually large units. Featured are laboratory and manufacturing facilities for custom formulating and production. The three major services for industry are (1) a custom service of applied coatings, using plastisol, epoxy, vinyl, neoprene, etc., (2) the manufacture of these coatings for resale in any quantity, and (3) the manufacture of completed and coated equipment. These coating compounds are used as inner linings and outer coatings for tanks, ducts, plating racks, material handling equipment, rolls, baskets, chutes, hangers, conveyor parts, etc.

99.75+% PURE

Every batch checked. Every can filled with a full weight of extra high quality 99.75+% Chromic Acid. Prompt delivery from ample factory and nearby distributor stocks. Why not order BFC Chromic Acid next time?

BETTER FINISHES & COATINGS, INC.

268 Doremus Avenue, Newark 5, New Jersey

2014 East 15th Street, Los Angeles 21, California

Another Richardson Allen Engineering "First"

Demonstrating the same unsurpassed initiative, ingenuity and craftsmanship which, over the years, have set the pace of progress for the entire industry. Richardson-Allen engineers—working in close cooperation with Westinghouse engineers—have developed and perfected the ultimate in power rectification.

SILICON

DEPENDABLE POWER RECTIFIERS

HERMETICALLY SEALED JUNCTIONS — HIGH TEMPERATURE OPERATIONS

VERSATILITY—Richardson-Allen silicon rectifiers are now available for the plating and industrial fields in ratings up to 500 kws.

EFFICIENCY—Richardson-Allen silicon rectifier units are now supplying major industries with an unprecedented amount of direct current—with no loss in efficiency, no aging and no apparent limit to the life of the silicon junctions. Single silicon junctions are designed to withstand up to 300 vpi.

ECONOMY — Occupying unbelievable small space, the initial cost is often lower than other conversion methods; practically no maintenance is ever needed and when installation savings and power savings are figured the total amount is impressive.

For additional information, write to:

RICHARDSON ALLEN Corporation

DEPENDABLE RECTIFIER SPECIALISTS

a Manufacturing affiliate of

WESLEY BLOCK & CO., INC., 116-15 Fifteenth Ave., College Point, L. I., N. Y.

IN CANADA: Richardson-Allen of Canada, Ltd., 1236 Birchmount Rd., Scarborough, Ontario

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 316.

PERSONALS

Button

Perry

Bland B. Button has been appointed vice president of sales for The Diversey Corp., Chicago.

Mr. Button will direct a nation-wide, 250-man sales force selling specialized chemicals to the metals processing industries.

Prior to his new appointment, he was general sales manager, responsible for the sales and office operations of Diversey's eight regional sales divisions.

R. C. Perry is the new general sales manager. He was formerly Pacific Division manager.

Three new positions in Diversey's field management structure have been created by splitting the Eastern, Pacific and Southern Divisions. Eastern Regional manager is **J. M. Sharp, J. K. Bradford Jr.,** is now Southern Regional manager, and **J. R. McBrien** has been transferred to the Pacific Coast as Pacific Regional manager.

Liffick

Alexander

Fenton Liffick has been named midwestern sales representative for Mac Dermid Incorporated, Waterbury, Conn.

Working closely with **Edward F. Stack,** the present Mac Dermid representative in that area, Mr. Liffick will concentrate on the company's line of metal cleaning, plating and finishing chemicals and compounds in Iowa, Wisconsin, Minnesota and northern Chicago.

Mr. Liffick brings a wide and varied background of metal finishing experience to the newly created post. He has been an analyst, plating foreman and plating room superintendent. He comes to Mac Dermid from the Promat Division, Poor & Co.

Alexander Alexander has been appointed finishing engineer by Hanson-Van Winkle-Munning Co. in its Chicago area.

He will assist H-VW-M salesmen in fifteen midwestern states in problems and service relating to the buffing and polishing of metals and plastics.

Mr. Alexander has many years of experience as a buffing foreman, set-up engineer in buffing and polishing applications and job shop owner.

Miller

Stine

Durando Miller has been appointed technical manager of The Permutit Company, New York, engineers and manufacturers of equipment for water conditioning, ion exchange and industrial waste treatment.

Mr. Miller will be responsible for industrial treatment processes to be used, performance guarantees, the use of pilot plants for specific field problems and other technical matters.

He has been with Permutit since 1938 and has served as assistant technical manager since 1953. He is the author of many papers on water conditioning.

Victor F. Stine has been elected president of Pangborn Corp., Hagerstown, Md., manufacturers of blast cleaning and dust control equipment. **Ralph M. Trent** assumes the duties of a director and executive vice president and **W. O. Vedder** was elected a vice president. **Thomas W. Pangborn,** founder and president since 1904 will continue as chairman of the board of directors. **John C. Pangborn,** former first vice president is vice chairman.

Mr. Stine, with Pangborn for 45 years, started as a bookkeeper, and in 1935 became second vice president and sales manager. He is credited as the man most responsible for bringing Pangborn to prominence in modern metal cleaning methods and industrial dust control.

Arthur B. Tillman, assistant works manager—Operations of the Painesville, Ohio, plant of Diamond Alkali Co., Cleveland, since August 1955, has been promoted to the newly-created position of Electro Chemicals Division operations manager.

He belongs to the American Chemical Society and the American Institute of Chemical Engineers. He is also a member of Alpha Chi Sigma, professional chemical fraternity, and Tau Beta Pi and Sigma Xi, honorary engineering and scientific fraternities respectively.

E. Lacy, for many years a member of the Detroit staff of Oakite Products, Inc., has been transferred to Houston, Texas. **John C. Ruttle,** a member of the Society of Die Cast Engineers, will serve the metal industries in western Detroit for Oakite.

William H. Weed has been appointed manager, engineering department of Mutual Chemical Division, Allied Chemical & Dye Corp. Mr. Weed, previously chief process engineer, will be responsible for all activities of the engineering department which is located at Mutual's Baltimore works. A graduate of the Massachusetts Institute of Technology, Mr. Weed joined Mutual in 1940.

George R. Lawson has been made a director of marketing of Pennsalt Chemicals' Industrial Division. In this newly created position, Mr. Lawson will direct the combined sales organizations of the former Sharples and Industrial Chemicals Divisions which were recently consolidated in the formation of the Company's new Industrial Division.

The products of this Division include organic and inorganic industrial chemicals and numerous Sharples brand organic chemicals.

Arthur F. Bixby has been named manager of marketing research for Pennsalt Chemicals' Industrial Division. Under the director of marketing, George R. Lawson, Mr. Bixby will supervise product managers and direct market development.

Swanton

Sailor

Robert R. Swanton and **Ted A. Sailor** recently joined the industrial department of Wyandotte Chemicals Corp. Mr. Swanton, with 13 years' experience in the electroplating field, will headquarter in Wyandotte's Detroit office; Mr. Sailor in the company's Chicago district.

Mr. Sailor began his metal finishing career in 1933 with a Chicago plating company where he remained 14 years. For the past seven years, he was with the metal finishing department of Sunbeam Corp.

THE **NEW** SIZE **OFHC**® ANODE

Originally produced specifically at the request of a large consumer, the new 1½- x 3-inch oval anode made from OFHC premium quality copper is *now available* to the entire electroplating industry. Here are some of the advantages of this new size which may be applicable to your operation:

1. **EASIER HANDLING**
   weighs only 1.15 pounds per inch of anode length
2. **GREATER PLATING SURFACE AREA**
   more anodes per rack means greater surface area exposed to bath
3. **SAME PREMIUM QUALITY OFHC COPPER**
   this means
   - more usable copper per anode
   - smoother finishes
   - product uniformity
   - no bags or diaphragms needed

For more information on the advantages of OFHC anodes, contact—

NOW FOUR OFHC ANODE SIZES AVAILABLE!

3" Round

2" x 3" Oval

2" Round

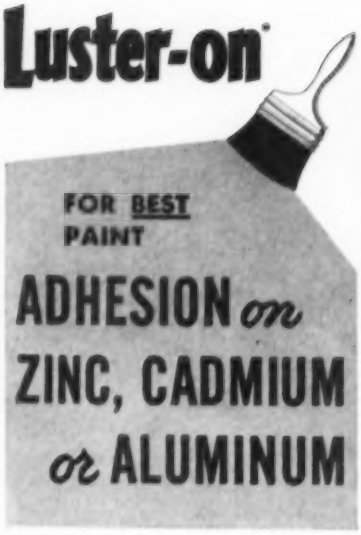
NEW
1½" x 3" Oval

Metal Sales Department

THE AMERICAN METAL COMPANY, LTD.

61 Broadway, New York 6, N. Y.

Luster-on®



FOR BEST PAINT

ADHESION *on* ZINC, CADMIUM *or* ALUMINUM

Long-time tests in the aviation and electrical appliance fields have proved that paint adhesion to surfaces treated with LUSTER-ON is superior to that found with other chromate conversion coatings. LUSTER-ON imparts a passive surface which offers corrosion protection and best adhesive base for paint.

LUSTER-ON MEANS ECONOMY

On zinc or cadmium — use *dilute* concentrations of LUSTER-ON utility liquids or *low* concentrations of LUSTER-ON 50 POWDER.

On aluminum — use *low* concentrations of LUSTER-ON ALUMINUM SEALER.

No current is required — no fumes to exhaust.

LUSTER-ON proved formulas offer excellent operating control

Superior treatment for zinc-base die castings, too!

Data Sheets and Prices on Request. Send in part for free processing.

West Coast: Crown Chem. & Engr.
Los Angeles & San Francisco
Canadian Licensee: Alloycraft Ltd.
Montreal

THE *Chemical* CORPORATION
57 WALTHAM AVE., SPRINGFIELD, MASS.

PERSONALS

Thompson

Bowes

E. B. Thompson has been named general sales manager of Parker Rust Proof Co., Detroit, Mich.

Mr. Thompson joined Parker 19 years ago when he graduated from the University of Michigan, and was assigned to Parker's New York office sales-service staff. He became Western Region and Chicago office manager, and eight years later was transferred to Detroit as assistant sales manager.

Vincent E. Bowes has been appointed petroleum service manager for Kelite Corporation, manufacturers of industrial chemicals and steam cleaning equipment.

Mr. Bowes was formerly associated with Oakite Products, Inc. of New York, as manager, petroleum service Division.

Howard S. Thrasher has been promoted to general sales manager of The Seymour Manufacturing Co., Seymour, Conn.

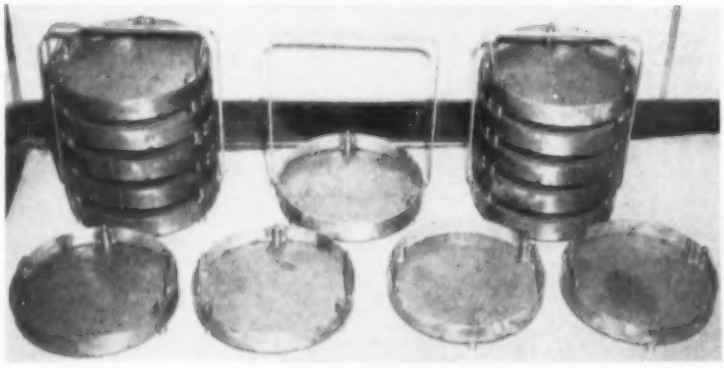
With **Adolph W. Grele,** simultaneously named assistant sales manager, Thrasher will supervise selling activities both for the nonferrous metal producing company and its wholly-owned subsidiary, The Phosphor Bronze Corporation.

W. C. Shattuck has been named special sales representative in the New York headquarters.

H. Denis Hughes, founder of Metachemical Processes Ltd. of London and Crawley, England, has been elected president and general manager of Dalic Metachemical Ltd., Toronto, Canada. The Canadian firm controls the North American rights for manufacture and distribution of the patented Dalic process and equipment, used in selective, localized plating of metal.

Mr. Hughes is an Associate of the British Institute of Metallurgists. He has been chairman and managing director of the London firm for the last nine years, and will retain this position. In addition to guiding both the British and Canadian enterprises, Mr. Hughes will also be technical advisor to the American associated firm, Marlane Development Co. of New York City.

Storts for trays and racks



Equipment for handling small parts in process has long been a Storts specialty. Dimensional accuracy and strong, tough, ductile welds combine to assure the fine performance and long service life that means complete satisfaction for you. Remember too, that Storts has facilities and time-tested procedures for all commercially available metals and alloys.

42 STONE STREET — STORTS WELDING COMPANY INCORPORATED — MERIDEN, CONN.

Manufacturers of Welded Fabrications to Specification

(Advertisement)

Special Reports On Finishing Non-Ferrous Metals

NUMBER II—Paint Base, Corrosion-Resistant Finishing with Iridite

WHAT IS IRIDITE®?

Briefly, Iridite is the tradename for a specialized line of chromate conversion finishes. They are generally applied by dip, some by brush or spray, at or near room temperature, with automatic equipment or manual finishing facilities. During application, a chemical reaction occurs that produces a thin (.00002" max.) gel-like, complex chromate film of a non-porous nature on the surface of the metal. This film is an integral part of the metal itself, thus cannot flake, chip or peel. No special equipment, exhaust systems or specially trained personnel are required.

Chromate conversion coatings are well known and accepted throughout industry as an economical means of providing corrosion protection, a good paint base and decorative finishes for non-ferrous metals. However, continued developments have been so rapid and widespread that many manufacturers may not be completely aware of the breadth of application of this type of finish. Hence, this digest of current information; to bring you up to date on the many ways in which you can obtain proper surface preparation for painting and increase product durability with a single multi-purpose chemical pretreatment. Report I on decorative, corrosion-resistant finishes and Report III on chemically polished, corrosion-resistant finishes are available on request.

First, it is an accepted fact that metal surfaces should be prepared before painting to make possible an efficient paint system. Naturally, this preparation should provide for good initial paint adhesion. Chemical treatments have proved extremely effective in this respect, particularly those of a neutral or preferably acid nature. Further, to be most efficient, chemical treatments should provide a non-porous barrier to maintain adhesion by sealing the metal from the paint and moisture. They should also provide a self-healing film which prevents lateral corrosion in the event that bare metal is exposed through scratching.

The Iridite chromate conversion coatings meet all these requirements. Iridite is a chemical conversion treatment for surface preparation. It provides initial paint bonding by molecular adhesion. It is acid in nature and produces a film that is gel-like and non-porous in structure. Thus, the Iridite film effectively seals the metal from the paint and from moisture penetration. Because the film contains certain relatively soluble constituents, it will protect areas scratched through to bare metal and prevent lateral corrosion. This is accomplished by a gradual leaching of these constituents into the damaged area.

Further, because of its gel-like, non-crystalline nature, the Iridite film will not affect the appearance or texture of the paint film, nor will it dust or powder to mar the painted surface. Because the film is non-porous, paint coverage is increased, thus substantial savings in paint costs will be realized. In addition, treated parts may be stored for long periods of time prior to painting without the risk of entrapped moisture causing blistering when painting.

Iridite chromate conversion coatings are widely used with equal ease and success under both baked and air-dried paint systems. While the actual adherence properties of the Iridite film do not increase appreciably with its thickness, corrosion protection does. The protection of the Iridite film is proportionate to its thickness and should be taken into consideration when selecting the Iridite to meet your needs. However, it is sometimes necessary to sacrifice maximum corrosion protection for appearance when a finished part is to be only partially painted. For example, it may be desirable to use a thin, clear, bright Iridite film if the unpainted areas must present a chrome-like appearance. A typical case is that of instrument housings on which the exterior is painted and the inside left unpainted.

On the other hand, if all surfaces of the product are to be painted and maximum corrosion protection is required, the heavier and most protective Iridite films should be used. For example, all surfaces of zinc die cast fruit juicers are finished with a highly protective Iridite film prior to painting to provide maximum resistance to the corrosive action of fruit juices.

Iridite finishes are now available for all commercial forms of the more commonly used non ferrous metals, including zinc, cadmium, aluminum, magnesium, silver, copper, brass and bronze. In addition to providing an excellent base for paint, the Iridite films also have high decorative value when used as final finishes in themselves.

These films can produce a wide variety of pleasing appearances including clear bright, iridescent yellow, bronze, olive drab and brown. In addition, many films can be modified by bleaching or by dyeing. Among the dye colors available are various shades of red, yellow, green, blue or black.

In planning or designing, you should consider the many other characteristics of Iridite finishes which may enter into the specific problem. In addition to their functions as protective and decorative finishes, and as bases for organic finishes and bonding compounds, Iridites have low electrical resistance. Some can be soldered and welded. The film does not affect the dimensional stability of close tolerance parts.

Iridites are widely approved under both Armed Services and industrial specifications because of performance, low cost and savings of materials and equipment.

You can see then, that with the many factors to be considered, selection of the Iridite best suited to your product requires the services of a specialist. That's why Allied maintains a staff of competent Field Engineers—to help you select the Iridite to make your installation most efficient in improving the quality of your product. You'll find your Allied Field Engineer listed under "Plating Supplies" in your classified telephone book. Or, write direct and tell us your problem. Complete literature and data, as well as sample part processing, is available. Allied Research Products, Inc., 4004-06 East Monument Street, Baltimore 5, Maryland.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 320.

BOOKS

Remittance must accompany all book orders placed with AES Headquarters.

ASTM Methods for Chemical Analysis of Metals. Revised 1956 Edition. Cloth cover, 640 pp., $8.00; AES members, $7.20

The 1956 edition of the book of ASTM Methods for Chemical Analysis of Metals is the first complete revision of the volume since 1950. It is essentially a part of the Book of ASTM Standards and contains all ASTM methods for chemical analysis of ferrous and non-ferrous metals and alloys, including spectrochemical procedures. It complements Part 1 on Ferrous Metals and Part 2 on Non-Ferrous Metals of the Book of Standards.

There are ten completely new methods and recommended procedures in the book. These include chemical analyses for electronic nickel and titanium and two important recommended practices in the field of spectrochemical analysis. In addition, ten standards have been substantially revised since 1950. The book contains 42 methods of analysis including four spectrochemical procedures. There are five recommended practices and one specification. Some of the standards contain comprehensive diagrams of apparatus and pertinent charts.

Ferrous Metals. Part 1, 1956 Supplement to ASTM Standards. Heavy paper cover, 440 pp., $4.00; AES members, $3.60

Included in this book are 48 standards covering steel pipe; steel tubes; steel forged or rolled pipe, fittings and welding fittings; steel castings; steel bolting materials; boiler steel plates and rivets; structural and rivet steel; spring steel and steel springs; steel chain; corrosion resisting and heat resisting steels; cast iron; and nodular iron.

Non-Ferrous Metals. Part 2, 1956 Supplement to ASTM Standards. Heavy paper cover, 360 pp., $4.00; AES members, $3.60

This volume covers 60 standards for copper and copper base alloys; nickel and nickel base alloys; electrical resistance and related alloys; metal powders and products; die cast metals and alloys; aluminum and aluminum alloys; magnesium and magnesium base alloys; and metallic electrical conductors.

American Society for Testing Materials Standards on Zinc-Coated Iron and Steel Products (A-5). 143 pages, Published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $2.25

This publication presents in a convenient form for reference the various American Society for Testing Materials standards and tentative methods for test and specifications pertaining to metallic coated iron and steel products. Standards, tentative specifications and methods of test represent the most up-to-date thoughts and practices.

This compilation is sponsored by Committee A-5 on Corrosion of Iron and Steel. Included are all specifications coming under the jurisdiction of this Committee. In addition, selected specifications written by Committee A-1 on Steel, A-2 on Wrought Iron, B-1 on Wires for Electrical Conductors, and B-2 on Non-Ferrous Metals and Alloys may be found in this compilation.

Included in the volume are 21 specifications of which four are new or recently revised; three recommended practices, two of which are new; and five methods of tests. Among the materials covered are wire, strands, fencing, sheets, hardware, terne-alloy-coated sheets and miscellaneous products.

It's still around, Sonny, but you can't see it. It's broken up too fine.

That's the way it is with oil, grease, drawing compounds, stamping compounds, and other soils removed from metal parts in a tank of . . .

Cowles NS SOAK CLEANER

No Scum on the cleaning tank to foul cleaned metal coming out. Clean it with Cowles NS Soak Cleaner and it *stays* clean.

For more information about the emulsifying power of Cowles NS Soak Cleaner for *soak-tank* cleaning before plating, enameling, other finishing . . .

Send this coupon for Technical Bulletin.

Cowles Chemical Company
7018 Euclid Avenue
Cleveland 3, Ohio
Please send Cowles NS Bulletin
Name
Company
Address
City State

Cowles CHEMICAL COMPANY
Cleveland 3, Ohio

MAIL BOX

DEAR SIR:

I read with much interest your fine January issue and indeed compliment you on a job well done.

It was gratifying, also, to see a photo of NAMF officials on page 82. However, the picture caption was incorrect with respect to the meeting purpose in that you indicated that it was "an NAMF reorganizational meeting." To correct any wrong impression, I hasten to add that the subject photo depicted NAMF officials who attended a New England reorganizational meeting. The NAMF was reorganized several years ago.

. . . trust that you will publish this letter to correct any possible erroneous impression that the NAMF per se is in the throes of reorganization.

P. PETER KOVATIS
Executive Secretary
National Association of
Metal Finishers

LOW COST

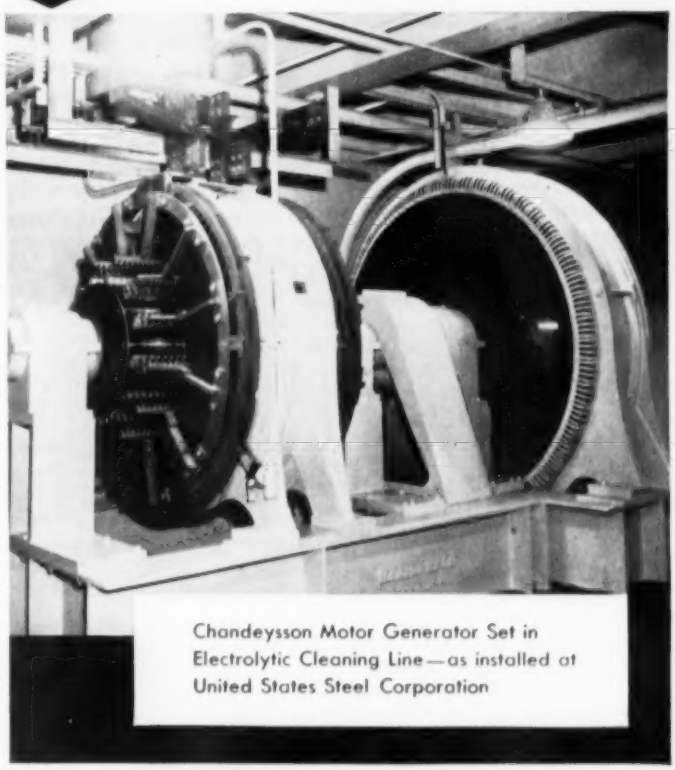
power conversion for a lifetime

Chandeysson

ELECTROLYTIC GENERATORS ARE BUILT FOR LONG TROUBLE-FREE SERVICE

Chandeysson electrolytic generators are designed to last and last . . and they do. The records prove it. Chandeysson units built 50 years ago are still performing dependably. And today's Chandeyssons have a half-century *more* of performance experience built into them. Long service life, efficiency and durability, ample overload capacity are the result of sound engineering, painstaking design, specialized craftsmanship, and thorough testing.

The most modern manufacturing methods are used every step of the way. Unified responsibility for manufacture of every component . . . from selected raw materials to finished product is in the hands of skilled men with decades of experience in building low-voltage generators. Our aim in engineering is to *prevent* design defects . . . rather than to correct for them. This is why more and more "Industry Leaders Choose Chandeysson!"



Chandeysson Motor Generator Set in Electrolytic Cleaning Line—as installed at United States Steel Corporation

MAKE US PROVE *to you that a Chandeysson Motor Generator is your most economical and dependable source of low-voltage dc current. Mail this coupon today.*

CHANDEYSSON ELECTRIC COMPANY
4076 Bingham Avenue • St. Louis 16, Missouri
Please send new descriptive booklet D-103

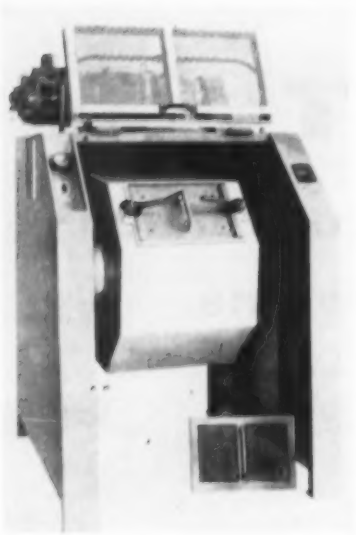
Name..... ..... *Title*.. .....
Company..... ....
Address. ....
City..... .....*Zone*....*State*.....

CHANDEYSSON ELECTRIC COMPANY • 4076 Bingham Avenue, St. Louis 16, Mo.

FOR FURTHER INFORMATION, USE READER SERVICE CARD: INDICATE A 322.

Equipment and Supplies

Use the convenient Reader Service Card to obtain additional information on any of these items



E—300. Finishing Barrel—A completely new finishing barrel, designed for users requiring variable speeds, has been developed by The Abbott Ball Co.

The new addition to the Abbott line features a 22 by 33-in. barrel of welded steel plate with a capacity of 1200 lb. Available in either single or double compartment units with or without neoprene linings, the barrel operates at a speed of from seven to 30 rpm. Among the modern safety devices and controls with which the machine is equipped are a poppet-type venting valve, a guard which functions as an automatic cut-off switch when raised, and recessed controls.

E—301. Steam Trap—A new, small light-weight bucket type steam trap for unit heaters, small processing machinery and like applications is available in ½-inch pipe size, with a universal pressure range from 0 to 125 lbs psi. Developed for low pressure-high condensate rate applications where a smaller and inexpensive trapping unit is needed, embodies all the features of the Unitrap line of steam traps.

This line of traps is completely universal in pressure application, with faster warm-up, less wear, lower maintenance and capable of handling more condensate per hour without steam loss, manufactured in pipe sizes from ½ inch to 2 inches.

The trap operates on a balanced pressure principle thru the unique function of its new and exclusive Dual-valve, which automatically compensates for differential pressures thru a range of 0 to 250 lbs psi.

E—302. Stand Positions Tumblers for Unloading—The Piggy Back stand is designed with two legs to bolt to the frame of the Rampe screen separator. It supports a tumbling unit in position to unload into the separator. The stand can be used either left or right hand or two stands can be used to position two tumblers to unload into the same separator. Stands are of all steel construction for heavy use.

Stands, tumblers and separator are products of Rampe Manufacturing Company.

E—303. Hose Assemblies—In answer to industry's urgent need for safe chemical resistant flexible hose units having superior physical properties to rubber or metallic types The Mic-Lin Company announces the Lin-Lok line of Teflon hose assemblies.

The assembly consists of a Teflon liner encased in stainless steel wire braid with full flow fittings permanently locked to the hose.

The units are capable of sustained operating pressures and are recommended for use wherever maximum chemical resistance, wide temperature and pressure range, non-ageing flexibility and ruggedness are prime requirements.

E—304. Thickness Tester—The Kocour electronic thickness tester Model 955 determines the thickness of plating and other metallic coatings deposited over various metals and non-metallic base materials with an accuracy of 90–95 per cent. Operation is very simple and virtually automatic. Readings are direct.

A multiple position switch indicates the plating to be tested. The thickness of decorative and heavy chromium, silver, tin, cadmium, zinc, copper, brass, nickel, lead, lead-tin, and tin-zinc alloy can be determined on steel, copper, brass, aluminum and other metals, and on non-metallic materials such as ceramics and plastics.

The accuracy of the instrument can be checked at any time, and a calibration adjustment will automatically correct high or low readings.

A constant pressure device automatically maintains a uniform pressure between test cell and specimen.

E—305. Stereo Microscope—The new Edmund Scientific Co. stereo microscope provides up to 3 in. working distance—gives an erect, clear sharp image, correct as to right and left. Viewer sees a wide, three dimensional field with depth perception. Two sets of objectives on a rotating turret. Standard pair of wide field 8X Kellner eyepieces give 21 power and 34 power. Additional eyepieces are available for greater or lesser magnification. The prism erecting system is low reflection coated. Helical rack and pinion focusing with large control knob for fine adjustment. Interpupillary distance is adjustable.

E—306. Buffing Compound Applicator—A brand new air-operated buffing compound applicator that permits the application of a full 10 in. of compound without resetting or adjustment is announced by the George L. Nankervis Co.

The new applicator, Model 1006, can be installed on all types of buffing machines from simple lathes to multi-operation automatics. Lightweight construction—less than 24 lb—permits installation on floating heads without disturbing balance. It can be installed in any position without affecting operation.

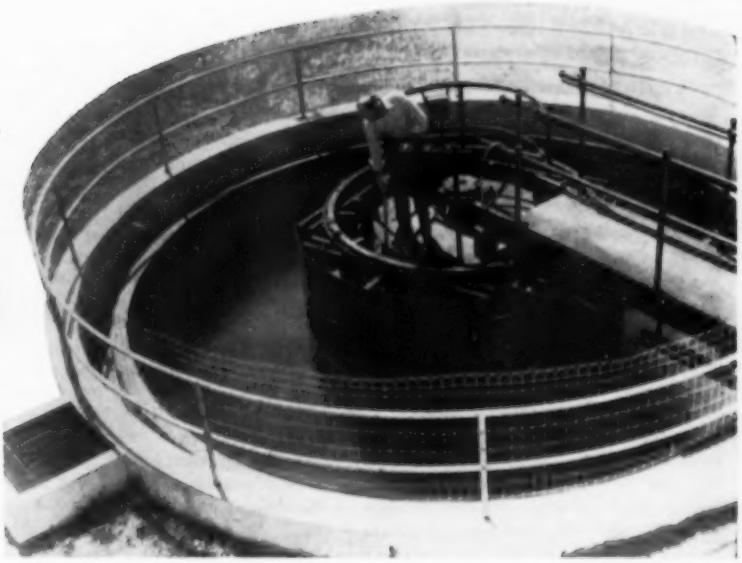
An important feature of the new applicator is its ability to feed any number of strokes per min.—applying compound only when required. It is also possible to operate up to eight applicators simultaneously from a single controlling valve, applying compound uniformly to all buffs.

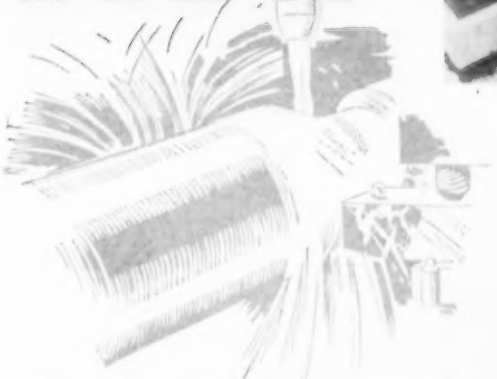
E—307. Corrosion-Resistant Plastic Liner—An epoxy base compound for use wherever non-corrosive liners are required has just been announced by The Homalite Corp.

Called Coroline 347, the new plastic is inert to organic acids, dilute mineral acids, to caustics, alkalines, and most solvents.

Coroline 347 is composed of two parts which are easily mixed at time of application. It can be brushed or sprayed on and may be used satisfactorily in applying

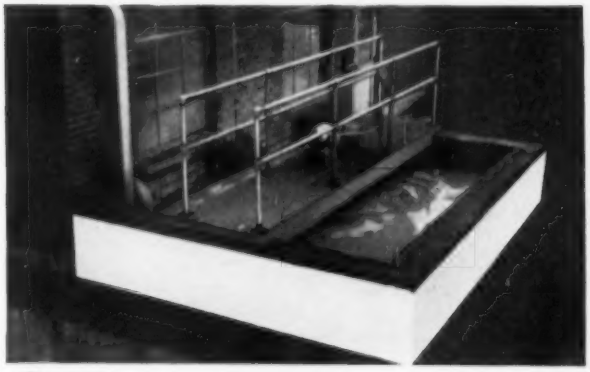
Disposal of metal finishing wastes—as easy as 1-2-3!





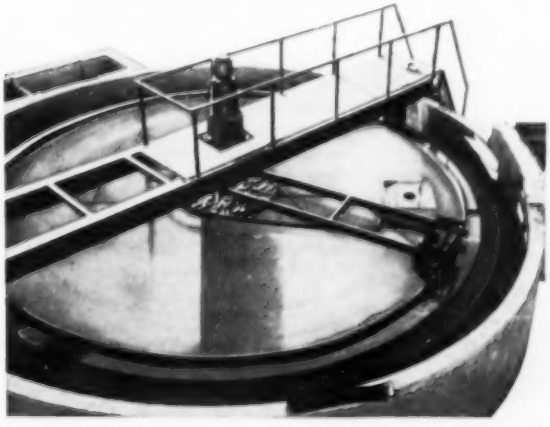
1. CYCLATOR® Clarifier: A high-capacity unit for removing metals, soluble oils and suspended solids, and for pH adjustment.

Treatment of pickle liquors, detergents, plating solutions, coolants and rinse waters is rapid and economical when you use INFILCO equipment. One or more of the units shown here will provide a permanent solution for your waste disposal problem.



2. VORTI-MIX® Circulator: For primary treatment of plating wastes which contain chromates and cyanide. Also applied to pickle liquor neutralization and cracking of oil emulsions.

3. PRIMARY CLARIFIER: For recovery of oil and removal of settleable solids when two stage treatment is required.



The proven success of this equipment in the metal finishing industry is your assurance of satisfaction. See your consulting engineer or write for complete information.

INFILCO INC.
933 South Campbell Ave.,
Tucson, Arizona

Field offices throughout the United States and foreign countries

INFILCO

The one company offering engineered equipment for all types of water and waste processing—coagulation, precipitation, sedimentation, flotation, filtration, ion exchange and biological treatment.

5622A

glass, cloth or other fabrics. When more than one coat is required, successive applications may be made immediately.

The plastic hardens at room temperatures in approximately 24 hr . . . does not require high temperature cures. Applications can be checked by high voltage spark testing.

E—308. Titanium Descaler and Magnesium Finishing Processes—A process that descales titanium and its alloys without adversely affecting the physical and chemical properties of the metal has been announced by Turco Products, Inc.

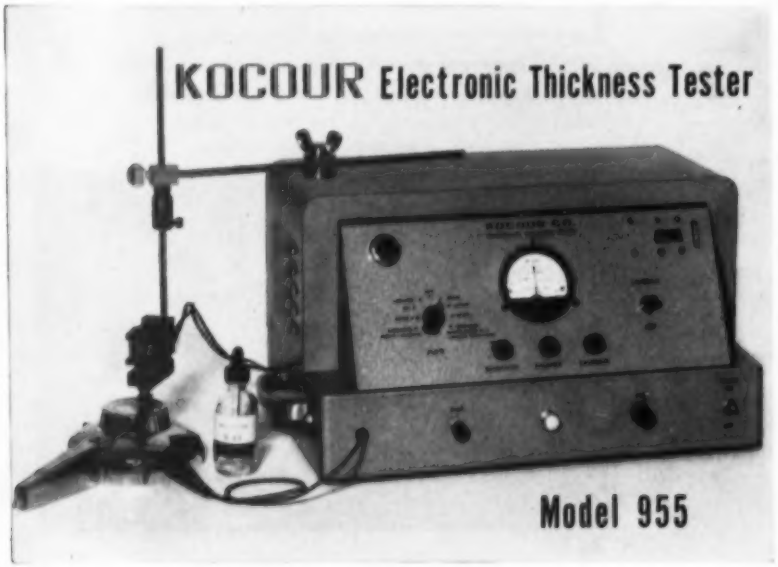
The new process requires only two immersion steps (one for scale conditioning and one for scale removing) and two rinsing steps, following the heat forming or heat treating operation.

The process gives 100 per cent chemical cleanliness without warping thin gauge material, without causing salt entrapment in faying edges, without creating fire hazards and without adversely altering the physical characteristics or surface smoothness of heat treatable alloys.

Development of two magnesium finishing processes to replace Dow No. 17 and Dow No. 18 has been announced by Turco.

The single-package processes are designed to provide magnesium with better corrosion resistance, abrasion resistance and paint bonding properties, to eliminate the need for precise measuring and mixing of several chemicals and to overcome the resultant inconvenience and chance for error. Additionally, they do not require complicated control procedures.

Both processes are approved for use by the Magnesium Division, Dow Chemical Co.



A NEW MODEL . . .

to solve your plating thickness problems!

Here's the New Model 955 . . . the answer to your plating thickness problems . . . a single instrument with a wider application than most other methods. And in addition, human error is virtually eliminated . . . operation is simple and automatic . . . readings are direct . . . accuracy 90–95% . . . results are reproducible . . . average test requires about one minute.

New Calibration feature ensures "long term" accuracy!

The accuracy of a thickness test can be no better than the accuracy of the method used. The Kocour Electronic Thickness Tester Model 955 gives you direct readings with an accuracy of 90–95%. Furthermore, with the new Calibration feature used in conjunction with Kocour Thickness Standards, you can not only check the accuracy, but calibrate the instrument to automatically correct slightly high or low readings. In addition any malfunctions due to a defective component will be indicated. Don't risk the quality of your product any longer . . . get the deta'ls on the New Model 955 today!

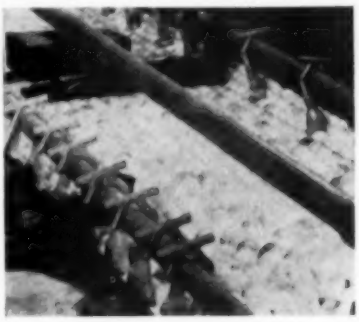
Ask for a demonstration or 15-day Free Trial!

KOCOUR CO.

Pioneers in Control for the Plating Industry

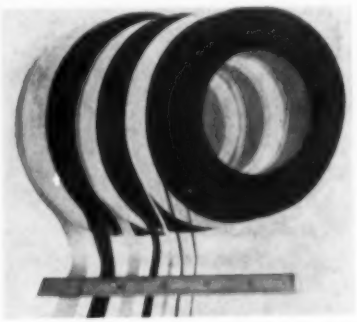
4801 S. St. Louis Avenue, Chicago 32, Illinois

E—309. Polyethylene Spheres—Corrosive and noxious acid fumes from metal plating tanks can be smothered under a blanket of hollow spheres molded of Bakelite polyethylene that resists almost indefinitely the acid solutions the spheres float on. Ordinarily, gas bubbles rise to the surface of metal plating solutions and



burst, throwing a fine, corrosive mist into the air. Cosom Industries, Inc. designed these hollow spheres of polyethylene which form an evenly spread blanket over the surface of the tank. Polyethylene was selected for these spheres because of its remarkable inertness to strong acids and other chemicals. The spheres are about one and one-half inches in diameter.

E—310. Narrow Tape—A new slitting technique developed by the By-Buk Co produces standard 60 yd rolls of any pressure-sensitive tape in precision widths as narrow as $^1/_{32}$ in. This new process leaves perfectly smooth clean edges and assures uniform width throughout the roll.



For printed circuit master drawings they have all widths of narrow black photographic tape ready for shipment, including $^1/_{32}$, $^1/_{16}$, $^3/_{32}$, $^1/_8$, $^5/_{32}$, $^3/_{16}$, $^1/_4$, $^3/_8$ and $^1/_2$ in. Decimal sizes are produced on short notice. The production of special decimal or fraction size regular masking tape between the standard widths produced by tape manufacturers is also part of By-Buk's service.

E—311. Funnels for Tumbling Barrels—To speed up loading of tumbling barrels as well as to minimize spilling of materials, Rampe Manufacturing Co. has introduced a line of removable funnels to fit all of their tumbling barrels.

WIN a HIGHER RATING
For Every Type of Plating!

← Check the Information You Desire, Today!

FOR ZINC PLATING

(1) ROHCO 503 STILL OR BARREL ZINC BRIGHTENER (LIQUID)—produces jewel-like bright zinc deposits; ideal where one brightener is desired for all your bright zinc baths.

(2) ROHCO 100 AND 100 SPECIAL BARREL BRIGHTENERS (LIQUID OR POWDER)—the most widely used of all barrel zinc brighteners; brilliant, bluish deposits directly from the plating tank.

(3) ROHCO 200 BARREL BRIGHTENER (LIQUID)—the newest addition to the ROHCO series; somewhat less brilliant deposits than with ROHCO 100 but at lower cost.

(4) ROHCO 150 (POWDER) AND PERMA-BRITE B-150 (LIQUID) BARREL BRIGHTENERS—the most economical barrel brighteners on the market; for maximum brightness a bright dip is required.

(5) PERMA-BRITE S-400 STILL BRIGHTENER (LIQUID)—somewhat less brightness than with ROHCO 503, at lower cost.

(6) ROHCO 120 STILL BRIGHTENER (LIQUID)—the most economical still brightener on the market; for large volume, large scale plating where maximum brightness is not necessary, generally requires a nitric acid bright dip.

(7) ROHCO ZINC PURIFIER—to keep baths in tip-top shape for unfailing quality and appearance.

FOR CADMIUM PLATING

(8) ROHCO 20XL AND SUPER XL (LIQUID OR POWDER)—tops for producing the clearest, brightest barrel, or still cadmium; minimizes cadmium usage by improving uniformity and speed of deposit.

(9) RODIP CD-3 AND CD-4—single short-dip chromate post-plating treatment without leach for brilliant cadmium with good corrosion protection; CD-3 for automatic tank or barrel, CD-4, for manual operations.

(10) CAD-SOL—a heavy solution of cadmium cyanide for easiest bath makeup or maintenance.

FOR CHROMIUM PLATING

(11) ROHCO SUPER NO-CRO-MIST®—safeguards workers' health by eliminating chrome fumes, solves ventilating and heating problems; saves chromic acid.

(12) HULL CELLS AND RECTIFIERS—for speedy, positive catalyst control.

FOR ALUMINUM ANODIZING

(13) ANODICATOR THICKNESS TESTER—an approved, new instrument for electrically checking thickness of anodic coatings. Completely automatic.

FOR ALL PLATING

(14) ROHCO RINS-AID®—water-shedder additions to rinse cycle to improve drying and to prevent staining.

(15) RECTIFIERS—for Hull Cell tests and/or plating operations. Complete range of capacities from 5 amperes up, with output to give 5% or less ripple. Optional automatic timers for 5 to 50 ampere units.

(16) HULL CELLS—used world-wide for control of plating baths. Porcelain or molded polyethylene in 267 ml. capacity. Clear lucite in 267 ml. and 1,000 ml. capacities with or without heater and thermostat

(17) ELECTRIC HULL CELL AGITATOR—new-type oscillating variable-speed to reproduce tank operation.

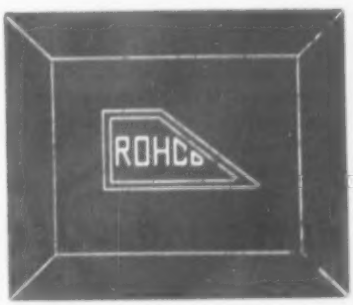
(18) ROHCO SAMPLING TUBE—unbreakable lucite. Designed for perfect sampling of plating baths without mess or fuss.

(19) HANGING HULL CELL—the only available device for making Hull Cell plating tests under production conditions.

R. O. HULL & COMPANY, Inc.

1302 Parsons Court Rocky River 16, Ohio

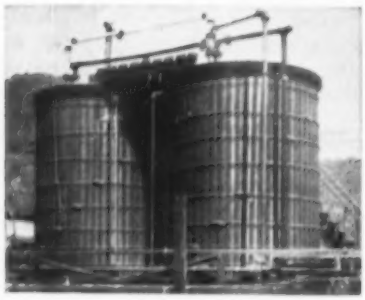
DISTRIBUTORS and STOCK POINTS: CHICAGO, ST. LOUIS, ARDCO, Inc. • TORONTO, CANADA, Armalite Company, Ltd. • LOS ANGELES-SAN FRANCISCO, Crown, Chemical & Engineering Co. • NEW ENGLAND, NEW YORK, PENNSYLVANIA, Enthone, Inc. • MINNEAPOLIS, W. D. Forbes Co. • BINGHAMTON, Austin F. Fletcher, Inc. • OREGON, WASHINGTON, Great Western Chemical Company • DALLAS and DAYTON, R. O. Hull & Company, Inc. • DETROIT, George L. Nankervis Co.



HAVEG News

Wherever CORROSION RESISTANCE is a Factor

HAVEG PLASTIC TANKS MEET EVERY SERVICE REQUIREMENT



HAVEG FUME SYSTEMS, CORROSION RESISTANT PROCESS EQUIPMENT

HAVEG STORAGE TANKS, REACTORS, COLUMNS, TOWERS, PLATING TANKS, FILTERS and similar equipment are now manufactured in every type and size, rectangular and cylindrical—in a wide range of Haveg grades, combined with selected chemically inert materials to provide exceptional resistance to corrosive acids, hypochlorites, salts, alkalies and various oxidizing agents.

HAVEG PLASTIC TANKS are tough and durable. Large Haveg storage tank installations have been in continuous service at leading processing plants as long as twenty-five years—under the most extreme corrosive conditions.

HAVEG TANKS are economical to install . . . easy to maintain. **NEW POLYESTER GLASS** constructions, for example, *cost considerably less installed than lead or rubber-lined, stainless or even mild steel types in many instances* . . . offer bonus savings in reduced steel for support because of their extreme light weight! Haveg plastic tanks require no painting or costly maintenance . . . can be readily field repaired where necessary.

Whether yours is a new or replacement installation, investigate the advantages of Haveg corrosion resistant plastic tanks and process equipment for your process operations. Write for Bulletin C-13.

Haveg fume duct, hoods, stacks, fans and fittings in the Haveg reinforced plastic best suited to handle the corrosive fumes and gases at your plant, offer the most practical and economical system possible wherever fume removal is an operational requirement.

Engineered for use up to 350°F., Haveg fume removal units are light in weight for easy, low cost installation, or for heavy duty service where required. Hoods are readily molded and joined in varying shapes and sizes . . . stacks up to 12 foot diameter and over 200′ high can be flanged for quick assembly—or resin-welded as a single unit! Complete fittings are available from stock, or can be custom-fabricated to your specific requirements. A Haveg engineer will be glad to assist you in planning a complete system for your plant . . . or selecting Haveg units to replace deteriorated apparatus in your present system.

You can make anything in Haveg that you can make from metal. Haveg is tough, durable, machineable, easily and quickly altered or repaired in the field.

Haveg Bulletins F-7 and C-13 give detailed data on the complete line of corrosion resistant Haveg process equipment and resin cements to solve *every* corrosion problem. Write for your copies at no obligation.

HAVEG INDUSTRIES, INC. 918 Greenbank Road, Wilmington 8, Delaware
Factory: Marshallton, Del. phone WYman 8-2271

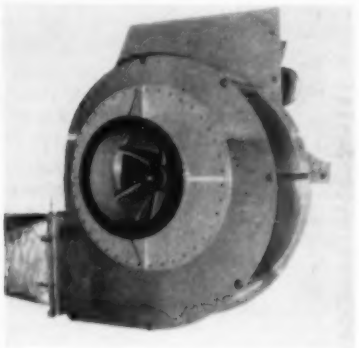
Atlanta Exchange 3821 | Chicago (Wheaton) WHeaton 8-3275 | Cleveland WAshington 1-8760 | Detroit (Livonia) REnewood 1-1785 | Houston JAckson 7-6840 | Los Angeles MUtual 1105 | New York (Westfield, N.J.) WEstfield 2-7383 | Seattle Main 9006 | Denver BElmont 7-0433

EQUIPMENT & SUPPLIES

Made of heavy gauge steel the funnels are quickly attached to the opening of the tumbling barrel and are just as quickly detached once the barrel is loaded. Funnels are made for barrels from one gal to eight cu ft capacity.

E—312. Corrosion Resistant Blower—Industrial Plastic Fabricators, Inc., announces the availability of a new, 40 in. diameter corrosion resistant PVC centrifugal blower, Model No. CB-40M, with a capacity of 15,000 CFM.

The new model, like all other blowers in the IPF line, is especially applicable to installations used to expel corrosive



air and fumes. The CB-40M centrifugal blower is constructed of unplasticized polyvinyl cloride which is extremely resistant to corrosion caused by the large majority of corrosive fumes and gases.

All IPF blower impeller wheels are designed with the back curve. Vibration is essentially eliminated and the impellers are not subject to unbalance.

E—313. Phosphating Compounds—The development of Oakite CrysCoat No. 47, designed to impart an iron phosphate coating of 80 to 120 mils in metal spray washing machines, has been announced by Oakite Products, Inc.

The new compound cleans and phosphates in a simple three-stage operation. It removes light oils, grease, spinning compounds and shop soils and converts the surface of steel and iron into a thin, dense coating that resists corrosion and gives lasting paint adhesion. The coating, under standard finishes, has withstood more than 600 hr of salt spray testing.

Oakite CrysCoat LT, is a new zinc phosphating compound for use at low temperatures in spray washing machines.

The new material produces a fine-grained, dense, uniform coating which meets specifications MIL-C-490A, Grade I, and MIL-C-16232A, Type II, calling for coating weights between 150 and 300 mg/sq ft on steel surfaces. Similar coatings are obtained on zinc.

Designed for application in five-stage washing machines, it produces coatings at

(*Continued on page 284*)

A NEW FAMILY OF
BRIGHT NICKEL PROCESSES

Hi-C by Udylite

FOR RACK OR BARREL PLATING

FASTER PLATING

BRIGHTER FINISH

SUPERIOR DUCTILITY

EXCELLENT LEVELING

EASY TO CONTROL

SAVES NICKEL

SAVES POWER

MADE ONLY BY UDYLITE

● ***High Chloride* Bright Nickel Processes,*** as pioneered by Udylite give faster, brighter nickel finishes than any other processes. Only Udylite produces high chloride bright nickels.

The Udylite family of nickel processes cover every possible application. The advantages of the Hi-C brighteners are also obtainable in the Watts type formulation. All these new Udylite nickel brighteners are liquids—easy to use.

Hi-C PROCESSES SAVE NICKEL: With their inherent better throwing power, less nickel is used to obtain thickness requirements in recesses. Baths with one third less nickel concentration are used to get the same results. This means decreased drag-out losses. Fewer anodes are needed since Hi-C processes provide the best anode corrosion of any nickel bath. You can operate satisfactorily with fewer anodes in your tanks.

Hi-C PROCESSES GIVE FASTER PLATING: Plating speed is increased 50 to 100% with Hi-C Bright Nickel as compared to Watts type formulations. Higher current densities can be used without burning. Even where agitation is not available, this same improvement prevails. You get faster plating with higher bath temperatures—can be as high as 190°F.

The Hi-C processes have the highest tolerance of any bright nickel baths to zinc, copper, iron, chromium, chromic acid and other common inorganic impurities; no problems with hard water; excellent tolerance to organic impurities. These characteristics of Hi-C processes plus their stability, mean exceptionally long periods between bath purifications and thereby less down time than any other bright nickel baths.

Hi-C PROCESSES SAVE POWER: With the highest conductivity of any bright nickel bath the Hi-C processes require less voltage to do the same job. It means higher current with the same voltage or the same current with lower voltage.

Hi-C PROCESSES PROVIDE:

Exceptional Bright Plate Range • Excellent Leveling • Fast Rate of Brightening • Superior Ductility • Easy Control • Less Hydrogen Embrittlement from Chromium Plating.

THE Udylite CORPORATION
DETROIT 11, MICHIGAN

WORLD'S LARGEST
PLATING SUPPLIER

THE UDYLITE FAMILY OF HI-C

FASTER PLATING

BRIGHTER FINISH

SUPERIOR DUCTILITY

EXCELLENT LEVELING

EASY TO CONTROL

SAVES NICKEL

SAVES POWER

MADE ONLY BY UDYLITE

UDYLITE 72 Hi-C Bright Nickel Process

FOR RACK PLATING

This is the work horse of the Udylite Bright Nickel Processes. It is an evolution of the time tested, world famous Udylite Number 31 Bright Nickel Process which has been a standard for over fifteen years. It is an excellent process where the production is made up of a wide variety of work.

The Udylite 72 Hi-C Process provides faster plating speed, a brighter finish, unusually simple control and greater throwing power, than Watts formulations.

Other advantages are leveling, tolerance to metallic and organic impurities and freedom from pitting. It produces no harmful breakdown products.

COMPARISON OF

Plating speeds and average current densities for Udylite Watts type bright nickel process vs Udylite Hi-C Bright Nickel Processes		Udylite Bright Nickel Process for Rack Plating. Watts Type. #72 #724	Udylite Hi-C Bright Nickel Process for Rack Plating. #72 Hi-C #724 Hi-C
	AVERAGE CURRENT DENSITY	40 Amperes per Square Foot	60-80 Amperes per Square Foot
	PLATING TIME FOR .001 THICKNESS	30 Minutes	15-20 Minutes

UDYLITE 724 Hi-C Bright Nickel Process

FOR RACK PLATING

The superior all-purpose Bright Nickel Process. No other process, with or without mechanical agitation, can compare with Udylite 724 Hi-C from any standpoint.

As compared to Watts type bright nickel formulations Udylite 724 Hi-C will permit up to 100% faster plating and you get unusually fast brightening even when thin deposits of nickel are applied. It has been developed also for the best leveling characteristics. Surface imperfections such as polishing lines, extrusion ridges and scratches are leveled out with this process. This means lower polishing costs for a given finish.

Even with the increased brightness and leveling, excellent ductility is maintained. Since 724 Hi-C is tolerant to metallic and organic impurities you will benefit from longer periods between treatments of the solution. This means less down time and lower costs.

You should try Udylite 724 Hi-C Bright Nickel Process. A test will tell you more than words.

WATTS TYPE FORMULATIONS OF THE ABOVE HIGH CHLORIDE

BRIGHT NICKEL PROCESSES

UDYLITE 7B4 Hi-C Bright Nickel Process

FOR BARREL PLATING

Here is the bright nickel process for barrels you have been looking for. Process 7B4 Hi-C offers 50% faster plating speed in barrel nickel plating than any other process.

The rate of brightening is so fast that one-third less nickel may be required to achieve the desired brightness and to hide basis metal defects. This also means fifty percent more production due to the acceptable thinner deposits. It allows for easier chromium coverage for racks or in chromium plating barrels. When using 7B4 Hi-C, current interruptions inherent in barrel plating do not cause laminated deposits.

Ductility and adhesion are excellent.

PLATING SPEEDS

Udylite Bright Nickel Process for Rack Plating. Watts Type. **#66**	Udylite Hi-C Bright Nickel Process for Rack Plating. Air Agitated. **#66 Hi-C**	Udylite Bright Nickel Process for Barrel Plating in 40 x 30 horizontal barrel—60 square feet of plating area. Watts Type. **#7B4**	Udylite Hi-C Bright Nickel Process for Barrel Plating in 40x30 horizontal barrel—60 square feet of plating area. **#7B4 Hi-C**
100 Amperes per Square Foot	150 Amperes per Square Foot	200 Amperes per Cylinder	350 Amperes per Cylinder
12 Minutes	8 Minutes	Plating Time for .0001 Thickness @ 12 Volts 40 Minutes	Plating Time For .0001 Thickness @ 12 Volts 23 Minutes

UDYLITE 66 Hi-C Bright Nickel Process

FOR RACK PLATING

This process was developed by Udylite Research to fill the need for a bright nickel bath which will plate as fast as possible and at the same time retain desirable characteristics of deposit which are frequently sacrificed when other processes are forced beyond their reasonable maximum plating speeds. In order to accomplish this result air agitation is used. This, together with an unusual combination of addition agents, fully covered by Udylite patents, makes possible not only unusually high deposition rates but also exceptional inherent ductility, brightness, and leveling together with minimum hydrogen embrittlement from chromium plating.

Udylite 66 Hi-C has remarkable freedom from pitting without the use of a wetting agent.

If you are now operating at maximum capacity of your present process and must get more production, it will pay you to investigate Udylite process 66 Hi-C.

FASTER PLATING

BRIGHTER FINISH

SUPERIOR DUCTILITY

EXCELLENT LEVELING

EASY TO CONTROL

SAVES NICKEL

SAVES POWER

MADE ONLY BY UDYLITE

BRIGHT NICKEL PROCESSES ARE ALWAYS AVAILABLE

OTHER NEW UDYLITE BRIGHT NICKEL PROCESSES

UDYLITE IS RECOGNIZED THROUGHOUT THE WORLD FOR ITS BRIGHT NICKEL PROCESSES. OVER 20 YEARS OF RESEARCH AND IMPROVEMENTS ARE BACK OF EACH FORMULA. ALL UDYLITE PROCESSES ARE PATENTED. MILLIONS OF GALLONS ARE IN USE.

UDYLITE 42 J Bright Nickel Process
FOR RACK PLATING

This process was developed by the Udylite Research Corporation for die cast and steel parts where only a thin coating of nickel is required. It has a greater tolerance to zinc than any other bath.

Process 42 J gives brightness faster than other processes which makes it desirable where only thin nickel deposits are specified, and still a brilliant coloring is desired. This permits an acceptable plate with great savings in the amount of nickel used.

The 42 J Bright Nickel Process also does an excellent job in plating in the low current density areas and still maintaining its brightness in these areas.

Udylite 42 J is not furnished in a high chloride formulation.

UDYLITE N.C.S. Nickel Process
FOR RACK PLATING

A semi-bright nickel with extremely ductile plate as is necessary for parts such as automobile bumpers and bumper guards where there is frequent impact. The extreme ductility gives the finest protection to the plated parts as it will stand greater deformation without cracking than bright nickel deposits. It produces a sulfur-free deposit. It has excellent leveling and unequalled stability for processes of this kind.

The Udylite N.C.S. Nickel Process hides coarse polishing lines and requires only a light buffing to bring out an excellent nickel color although it is more often used as a base for an overlay of one of the Udylite Fully Bright Nickel Processes.

Udylite N.C.S. is a special formulation featuring ductility although still maintaining the inherent advantages found in other Udylite Nickel Processes.

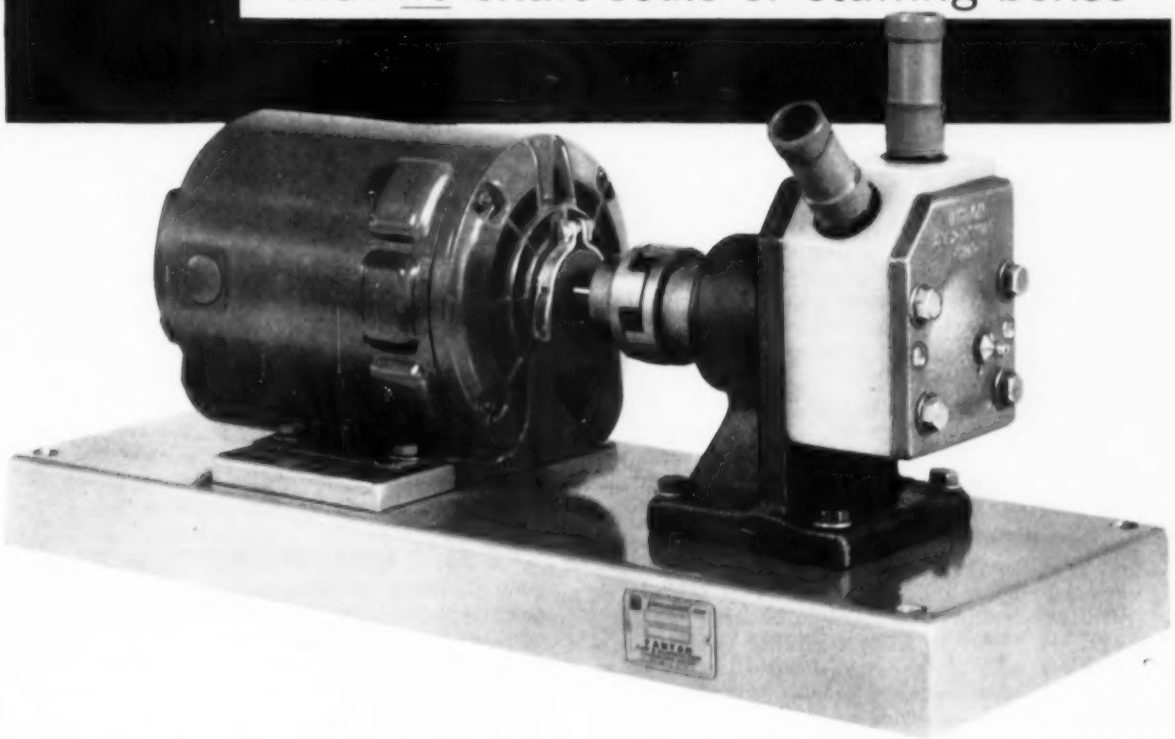
THE Udylite CORPORATION
DETROIT 11, MICHIGAN

WORLD'S LARGEST PLATING SUPPLIER

the VANTON Plastic "Flex-i-liner" pump

the only (repeat-ONLY) plastic rotary pump

with no shaft seals or stuffing boxes



The unique Vanton "flex-i-liner" design *eliminates stuffing boxes, shaft seals, gaskets and check valves*. Fluid contact is limited to the inner surface of a plastic housing and outer surface of a durable precision molded plastic or synthetic flexible liner. This allows safe and continuous handling of tough corrosives and abrasive slurries.

"Flex-i-liner" pumps are furnished in these materials:

Polyethylene—"P" Series—Excellent resistance to strong acids and alkalies. Excellent general chemical resistance and non-contaminating. Recommended for such typical applications as: Hydrochloric, Chromic, Hydrofluoric, Nitric, Phosphoric and Sulphuric acid; Calcium and Sodium Hydroxide; Sodium Hypochlorite; Hydrogen Peroxide and Distilled Water.

Buna N—"N" Series—High temperature resistance and suitable for use with weak acids, strong alkalies, vegetable and mineral oils. Recommended for such typical applications as: Plating Solutions, Chemical Salt Solutions at elevated temperatures; Petroleum Products; Tuna Fish Oil; Shortening; Ferric Chloride and Tile Glaze Slurry.

Bakelite—"B" Series—Excellent for organic solvents and organic acids. Good for weak acids and alkalies. Recommended for such typical applications as Acetic, Formic and Oleic acids; Ethyl and Methyl Alcohol; Carbon Tetrachloride; Gasoline, Kerosene, Fuel Oils; Photographic Solutions and Glycerine.

Liners are available from stock in Neoprene, Buna N, Gum or Natural Rubber, Hycar, Hypalon, Silicone, Vinyl or Compar.

Self priming with a gentle pumping action, Vanton plastic "flex-i-liner" pumps are available in capacities from ½ — 20 GPM and can be furnished direct connected to constant speed or variable speed motor equipment. Vacuums up to 26" Hg. are developed.

Bulletin VP562 on request.

VANTON
PUMP & EQUIPMENT CORP.
A division of Cooper Alloy Corporation HILLSIDE, N. J.

PAINTING AND THE PLATER

by Michael Borushko*

Departing from technical style, the author presents basic data for the plater entering the field of organic finishing. Ed.

THE PRODUCTS OF MODERN INDUSTRY are made beautiful and durable by the skills and knowledge of the electroplating industry and the painting industry. Combined, they clothe in attractive garments the ingenious contrivances of our clever engineers, lending to our modern lives a beauty and luxury which would have been impossible without the great advances of the finishing industries over the past 50 years.

Electroplaters have, in the main, been content to limit their interest and activity only to the application of metallic coatings, and for good reasons. Electroplating is a relatively new industrial art. Its most important tool, electricity, is itself, relatively new in human history.

Those engaged in the industry before our time were intensely preoccupied with the many problems of a new field; they were pioneers exploring a forest of odd metallic trees from whose branches hung strange fruits which too frequently went sour for reasons unknown to them.

As they paddled bewildered through their poisonous lakes of cyanides and acids, too often their only compass was a recollection of having done it "that-a-way" before. Today our solutions, while still poisonous, are the purest poisons we can compound, for the need for purity has been shown and the means for achieving it have been created.

Electroplating has a companion—painting. A companion in the sense that painting is frequently done for the same purposes as electroplating: beautification, protection or both. It is a companion because so many products use both plating and painting in their finishing schemes. But it is not an entirely friendly companion, for it is also a competitor to plating. If paint were somewhat more expensive, perhaps automobiles would be gold plated all over. On many other occasions it is a very helpful companion, for in times of plating metal famine it is used in the form of clear coatings to protect thin electroplated decorative coatings which have insufficient corrosion resistance of their own. Even in normal times much plated ware is protected by clear coatings; for example, jewelry, ornamental hardware and household ornaments.

* Kampart Industries, Inc., Detroit, Michigan.

Many electroplaters are already familiar with industrial paint coatings. Some who are connected with the smaller manufacturers carry responsibility for all types of finishes. Some companies selling plating, or plated wares, have been compelled in recent years to apply supplementary clear lacquers or enamels, and some job platers do job painting as a regular part of their business.

Is there any reason why an electroplater should be interested in the broad field of organic coating application?

Yes, because therein lie opportunities for a greater and more profitable use of his knowledge of metal surface-conditioning procedures. For the technical man in a small to medium sized plant—it offers the opportunity to become a general finishing expert. For the job shop operator, whose customers often buy painting as well as plating services—the opportunity to realize greater returns from his sales efforts.

COST COMPARISON

For the benefit of those who have had little or no contact with organic coatings, here are some comparisons with electroplated coatings. Material costs are lower for organic coatings than for electroplated coatings when compared at equal film thickness. The material cost per sq ft for a one mil thickness of organic coating will range from four cents for the most expensive of today's materials to as low as $^1/_{10}$ of a cent, based on material as applied. Metallic coatings on the same basis, taking anode cost alone as the material cost, will be approximately eight cents for cadmium, four cents for nickel, one cent for lead, and $^3/_4$ of a cent for zinc.

Costs of application vary so widely in both fields of coating, depending upon type of work, quality of finish desired, and equipment available, that it is difficult to make any useful generalization regarding a comparison. However, equipment cost for painting is generally much lower than equipment for plating an equal area per unit time. Furthermore, the techniques of paint application are comparatively simple when compared with those of electroplating.

The chemistry and physics of organic coating manufacture are very complex, and most successful formulations are finally achieved by "trial and error" experimentation.

Minor surface defects can be quite readily hidden or filled with organic coatings, and some special effect surface coatings, such as wrinkle enamels and hammertone finishes, will hide even quite major defects.

Defective work in painting is generally more easily repaired than in the case of electroplating.

It is generally easier to refinish an old and worn painted surface than it is to replate an old and worn plated surface.

As in electroplating, uniformity of film thickness is not always easily attained. For example, in dip painting the coating tends to pull away from edges and lap seams, and also to deposit with some taper in the paint film, and in hand spray painting the skill of the worker determines the uniformity in thickness.

A great variety of colors and effects are available in organic coatings: gloss, semi-gloss, and flat finishes, wrinkle enamels, hammer-tone effects, crystal lacquers, pearlescent finishes, pigskin effects, metallic finishes, and crackle finishes. Furthermore, it is now possible to obtain a two or three color finish by spraying only one coat of material.

Organic coatings can be very resistant to alkalies, acids, and other chemicals; comparing favorably with most metals available for electrodeposition. However, most thin organic films are quite permeable to water vapor and acid gases. A very heavy film, 10 mils and more, is therefore necessary when an organic coating is used to protect a metal under conditions of long immersion in a corrosive solution.

Organic Coatings as a group have less resistance to organic liquids such as oils and solvents than do electroplated coatings, but can be formulated to have sufficient resistance for specific applications wherein there is some considerable exposure to organic liquids.

Some organic coatings are comparatively heat resistant; for example, the silicones, though nowhere near as much so as most metallic coatings.

Organic coatings are not as resistant to abrasion or impact, nor are they as hard as metallic coatings.

What faces the plating man when he enters the field of organic finishing? How does his present experience fit into it? What will he need to know that is foreign to him now? To begin with, frequently parts that are to be painted require deburring, or some degree of grinding, sanding or polishing to remove weld flash or tool marks. Most electroplaters have knowledge of those operations.

Next, the parts will have to be thoroughly cleaned of all oils, drawing compounds, etc., and perhaps pickled to remove rust. The materials and procedures used are similar to those used for electroplating. Vapor degreasing, alkaline spray or soak cleansing, phosphoric acid solutions with wetting agents, are the cleaning methods commonly employed. In general, platers will be treading on familiar ground here. While on the subject of cleaning for painting, it is fitting to note that a good paint job requires as high degree of cleaning as does a good plating job. Poor cleaning prior to painting, however, is not as easily detected as it is in plating, because to all outward appearance, the job may appear quite satisfactory. Nevertheless, the paint will blister or peel very early in service, and in the case of very poor cleaning, may even start peeling while being handled during assembly operations. It should also be emphasized that good cleaning preparatory to painting requires the removal or neutralization of all traces of alkalies on the surface, and a common way to assure this is to give the parts a final rinse in a hot water containing small amounts of chromic and phosphoric acids ($^1/_{16}$ to $^1/_8$ oz/gal of each).

A fairly large amount of chrome plated goods today have areas that require colored lacquers or enamels for a decorative effect. This work is similar in nature to clear lacquering or enameling of the copper chrome systems, and when bad work is produced it is for the same reasons—improper treatment of the chrome plated surface before painting.

It is important that it be recognized that chemical cleanliness of the surface is just as vital for a good paint job as it is for a good plating job. Normally the chrome plated surface, as it comes off the chrome line from a clean, hot rinse which is free of wetting agents and preferably one of de-ionized water, is in good condition for painting, but the surfaces to be painted should not be handled with bare hands or dirty gloves before painting.

If buffing of chrome is done between plating and painting, the parts must be well cleaned before painting. Wiping with a solvent soaked rag or soaking the piece in solvent obviously is not good cleaning. Vapor degreasing is preferred, but soak cleaning in suitable, hot aqueous solutions, followed by a soak in a very dilute hot chromic acid solution, followed by good rinsing, is the preferred procedure.

A dry, clean location should be provided for painting. Freedom from dirt and lint in the coatings can be achieved if the work is wiped off with a tack rag just prior to painting, to remove the dust and lint. All coating material should be covered when not in use, to avoid contamination by air-borne dirt.

Today, steel, zinc and aluminum are generally given surface treatments of some kind prior to painting to insure permanent adhesion of the coating. In the case of steel, various types of phosphate coatings are used, and such coatings are also used with zinc and aluminum, but in addition for the latter two metals, several types of chromate treatments are also available. These surface treatments are not strangers to platers, for platers are familiar with their general purpose, their operation and control. So up to the point of actually putting the paint on the article, nothing is encountered that is totally strange.

APPLICATION

Now one prepares to apply organic coating. Generally the applier will have very little detailed information on the composition of the coating. It undoubtedly will have been selected on the assurance of the manufacturer that it will meet the performance requirements of the particular application.

It will be known, however, that its ingredients fall into several main classes, such as:

1. The binder, which becomes the continuous, protective film left by the coating on drying.
2. The pigment, a finely dispersed solid which remains dispersed in the binder, and which gives color and opacity, or "hiding" to the coating.
3. The solvent or thinner, in which the binder is dis-

solved. The solvent serves to produce a liquid composition of the binder and pigment so they can be readily applied to a surface. On drying the solvent evaporates and is a total loss.

4. Minor addition agents, such as dispersing agents, catalysts for drying, etc.

The nature and amounts of each of the specific materials of each class determine the properties of the coating; properties such as hiding power, filling ability, ease of application, drying time, durability, and resistance to various chemical agents. The details of these relationships need not become the concern of the painter—he will not be shirking his job at all if he leaves them entirely in the hands of the paint manufacturer, and can be quite confident that the finish will perform satisfactorily, if applied under the conditions of viscosity, baking time and temperature specified by the manufacturer.

How is it put on? That depends, depends on what tools are available, the sizes and shapes of the pieces, the volume of production, and on other factors. Organic coatings can be applied to very small items by bulk methods, as in tumble painting and centrifugal painting. Larger articles may be dip coated, flow coated, spray coated, or even brush painted.

In recent years there has been much intensive development in methods of application of organic coatings. In spray painting there are several forms of electrostatic spraying. In them the paint and work are oppositely charged so that the paint is attracted to the work and very little is lost as overspray. For hot spraying, the paint is heated to lower its viscosity. Less solvent is required and a saving in cost is realized.

Also quite new is steam spraying, wherein superheated steam is used as the impelling agent for the paint instead of compressed air. This results in a direct saving of paint because the behavior of super-heated steam is such that there is little or no bounce back from the surface being sprayed, as compared with compressed air.

Among recent innovations in dip coating is an ingenious machine which raises the dip tank to the work as it is carried horizontally forward on a conveyor, then lowers the dip tank. This makes it possible for dip painting and spray painting to be done on the same line, and a greater variety of work can be handled on one line.

Another development is hot dip painting, utilizing a tank constructed somewhat like a vapor degreaser. In this process the paint is kept hot and the painted article comes out of the paint hot. This heat drives the solvent out of the paint film and it is condensed and saved. The paint film is free of solvent as the painted article comes out of the paint tank. There is no dripping or other loss of paint, and as trichlorethylene is the solvent used, there is no fire hazard when painting by this method.

Fortunately, it is not necessary to have all types of painting equipment to successfully do industrial painting. Paint manufacturers generally will adjust their formulations to fit the method of application to be used, and often the very pail or drum in which the paint is received will serve as the dip tank from which it is used.

With many types of organic coatings a bake is required for curing of the coating, and many types of baking equipment are available, ranging from box type ovens to tunnels of infra-red lamps or similar devices. Here again, in many cases, the paint manufacturer can often adjust his formulations to suit the time and temperature limitations of the baking equipment available.

It has been shown how electroplating experience has prepared platers to become industrial painters and how little additional tools and knowledge are required. However, no game is entirely free of hurdles and hazards, and certainly this game has its share. Occasionally spoiled work will be produced and the plater will become familiar with such defects as:

(a) Insufficient or excessive film thickness—caused by incorrect viscosity or improper application.
(b) Pinholing—caused by water in the paint or compressed air line.
(c) Sags and runs—caused by improper paint formulation or improper application.
(d) Seediness—caused by improper paint manufacture.
(e) Dirtiness—caused by improper manufacture or by poor housekeeping while applying the coating.
(f) Lack of covering—generally caused by poor formulation.
(g) Poor adhesion—caused by insufficient cleaning or improper paint formulation or manufacture.
(h) Wrinkling—caused by too high a bake for the type of paint being used.
(i) Pigment float—caused by improper paint manufacture.
(j) Orange peel—from poor spraying practice or improper solvent.

There is some fire hazard in industrial painting, but it can be kept very low by good housekeeping and the use of proper electrical equipment. Health hazards have been reduced to a minimum by the elimination of highly toxic solvents and pigments from industrial paint formulations, and organic coatings involve less health hazard than many materials electroplaters now handle.

Comparison of organic finishing and electroplating clearly shows that painting and electroplating are two servants serving the same master, sharing similar problems. It has been shown that in this mutuality lie excellent opportunities for platers to realize greater advantages from their knowledge of the chemistry of metal surface processing.

Michael Borushko graduated from the Henry Ford Trade School and was an instructor in machine work for two years, then for several years worked at the Edison Institute of Technology in Dearborn, Michigan on one of the late Henry Ford's projects—finding industrial uses for the soybean and other farm products. This work led him into the paint field, and for 10 years he was with the Ditzler Color Division of the Pittsburgh Plate Glass Co. as research chemist on synthetic resins and automotive enamels. In 1945 he joined the then new plating firm, Harding Manufacturing Co. of Detroit, and was vice president and technical director from 1941 to 1945. He is now coowner of Rampart Industries, Inc. of Detroit, a new plating company which he hopes will grow into an organization capable of offering a complete finishing service.

The Development of Plastisol Systems for the Metal Coating Industry

by R. F. McTague*

In the past twelve years there has been an ever growing use of plastisol coatings for metal protection and metal decoration. During World War II synthetic rubbers and other polymers came to the forefront because of the natural rubber shortage. This economic and war-created necessity made rubber users realize that there were other good protective coatings to fight severe corrosion problems besides natural rubber. It might be said that World War II placed the manufacturer in a more receptive mood to accept new polymers, and new methods of application for these polymers.

Twelve years ago the chemical salesman talked gingerly about plastisols, because he was not quite sure himself what the end use might be for these unique dispersions. Quite possibly, this salesman had to explain to the customer at some length what the word plastisol meant. He would say that a plastisol was a dispersion of polyvinyl chloride resin particles in a plasticizer. At room temperature this dispersion was a heavy fluid mass, but on the application of heat it would fuse into a continuous rubber-like coating that was tough, and highly resistant to acids, alkalis, and other chemicals.

It was this type of sales promotion and creative thinking too, that made it seem logical that plastisols could have a place in the plating industry. One of the first applications for plastisols that really took hold was for plating racks.

Prior to the use of plastisols for plating racks, solution or latex coatings were used. These coatings, while they were air dried or force dried, had to be applied in multiple coats to acquire the necessary film build to be useful in the corrosive plating solutions. While plastisols had to be baked, one dip coat provided the necessary film build.

The early stumbling block for the formulator was to come up with a primer to adhere this chemically inert coating to the metal. It can be truthfully said that more research time has been spent in plastisol laboratories developing good primers than was spent in developing good plastisols. Baking primers were developed, because the heat used in baking the primer would be valuable in obtaining the weight pick up when the hot primed rack was submerged in the plastisol. It was necessary to bake the primer at a temperature of approximately 350 F for 15 to 30 min. The length of time required to bake the primer enabled it to be cross-linked structurally so as to resist the solvent or leaching action of the plasticizer in the plastisol. Other primers were developed, usually an acrylonitule rubber modified with phenolic resin, to obtain a bond to the metal, and to effect a barrier to prevent migration of the plasticizer into the primer.

New primers can be air dried, force dried or baked for long periods of time (up to ½ hr at 400 F) without affecting adversely the adhesion of the plastisol to the primer. Complicated racks with heavy metal spines and relatively thin cross members demanded a primer that could withstand varying amounts of heat without loss of adhesion. At one time it was difficult not to overbake the light weight members in order to sufficiently bake the heavy weighted spines. In a long baking schedule for the primer usually the spine of the rack picked up more plastisol than the cross members. Where thickness of plastisol was the greatest the rack user needed it the least! This difficulty has been surmounted by the new short bake or force dry primers, or by dipping spines and members separately, and assembling the coated rack later.

It wasn't long in any rack finishing room before the operators were coating metal tool handles with plastisol. It was a natural! The plastisol possessed excellent abrasion resistance, had a warm comfortable feel, and did not peel or crack as other coatings do, in time. A few tool manufacturers were enthusiastic about the new type of coating, and were highly pleased when they found out that it had good insulation resistance properties (in the neighborhood of 500v/mil). Ten years ago plastisol coated tool handles were not on the market. Now many nationally known brands of tools have enhanced the eye appeal of their products by using plastisols. The added cost of coating (a few cents per tool) is more than offset by the added features of a non-oxidizing coating with good insulation resistance. It is noteworthy to mention that plastisol

* Technical Director, Stanley Chemical Company, East Berlin, Connecticut

Spraying plastisol on collector tubs of automatic washing machine.

being a heavy coating eliminated many costly finishing operations that would be necessary if the handles were either plated or painted.

Pressed metal handles are now being coated with plastisol to eliminate the sharp edges imparted by the pressing operation.

Plastisols found an early acceptance in the dish drainer trade. Drainers in pre-war days had been coated with latex. Multiple dipping was necessary to build up a coating, and oxidation and soapy water took their toll in a few short months. The coatings became sticky, and food particles adhered to them. Vinyl dispersions with their non-toxic properties coupled with oxidation and soap resistance were a good answer to the problem. The resilient properties of rubber were retained, plus the aforementioned advantages.

Many dish drainers still bear the label "rubber coated" where in reality they are vinyl coated.

In order to formulate a coating for wire products it was necessary for the plastisol chemist to impart a non-drip property into the plastisol. As has been stated previously, at room temperature plastisols are fluids, and by the application of heat are converted into non-flowing solids. To obtain this "non-drip" condition prior to insertion of the plastisol coated article in the oven it was imperative that the plastisol possess thixotrophy. This thixotrophy had to be such that when the article was moving or plastisol was being agitated that the viscosity rose sharply. A general rule of thumb that is commonly used for "non-drip" plastisols is that the pseudo plastic ratio should be at least 1 to 5. That means that when a plastisol viscosity is measured on a Brookfield viscosimeter the viscosity value at a low (two) rpm should be 5 times the value than at 20 rpm.

This same property of Non-Newtonian flow applies also to spraying vinyl plastisols. With proper equipment and technique these plastisols can be applied by spraying at 100 per cent solids without the use of thinner diluent. In certain instances where thin coats or extremely smooth surfaces are required, a small amount of diluent can be used. When an ordinary plastisol is applied to a vertical surface, the plastisol within a short period of time, will flow and sag. By applying the "non-drip principle," plastisols can be manufactured that will show the minimum amount of sagging on a vertical surface and will not run even when allowed to remain at room temperature for a considerable length of time.

When these plastisols are placed in an oven and fused at specified temperatures there is also a minimum amount of flow. The term "minimum amount of flow" means that there is just sufficient flow of the plastisol so that the surface becomes smooth and glossy.

These plastisol coatings have excellent physical properties and outstanding chemical resistance. The accompanying physical and chemical data sheet illustrates the properties that can be expected from spraying plastisols.

TABLE I

PHYSICAL AND CHEMICAL DATA SHEET

Physical Data (Approximate)	
Tensile Strength (psi)	2000
Ultimate Elongation (%)	300
Durometer (Shore A)	70-75
Specific Gravity	1.2-1.3

Chemical Resistance Data on Spraying Plastisols

	Hours	
Hydrofluoric Acid 60% @ 90 F	240	OK
Hydrochloric Acid Conc. @ 90 F	240	OK
Hydrochloric Acid 22% @ 150 F	240	OK
Nitric Acid Conc. @ 70 F	240	OK
Nitric Acid 40% @ 90 F	240	OK
Nitric Acid 40% @ 100 F	24	FAIL
Phosphoric Acid 75% @ 150 F	240	OK
Sulfuric Acid 50% @ 150 F	240	OK
Sulfuric Acid 70% @ 180 F	24	FAIL
Sulfuric Acid Conc. @ 70 F	240	HARD
Chromic Acid 40% @ 150 F	240	Stained but OK
Chromic Acid 40% @ 200 F	24	FAIL
Ferric Chloride Acid 50%	240	OK
Calcium Hypochlorite (sat. sol.) @ 90 F	240	OK
Caustic Soda 35% @ 90 F	240	OK
Caustic Soda 10% @ 150 F	240	OK
Caustic Potash 35% @ 90 F	240	OK
Potassium Dichromate @ 150 F	240	OK
Trisodium Phosphate @ 150 F	240	OK
Sodium Metasilicate @ 150 F	240	OK
Castor Oil 100% @ 90 F	240	OK
Tide 5% @ 150 F	240	OK
Glim 5% @ 150 F	240	OK
Crisco & Lard 50/50 @ 150 F	240	OK
Sulfonated Oil 100% @ 150 F	240	OK
Kerosene Emulsion 60% H_2O	240	OK
Acetic Acid Glacial @ 90 F	240	OK
Acetic Acid 10% @ 90 F	240	OK
Copper Sulphate 50% @ 150 F	240	OK
Diesel Oil @ 150 F	240	OK
Motor Oil SEA20	240	OK
Glycerine @ 150 F	240	OK
Isopropanol 99% @ 90 F	240	OK

With a spraying plastisol, film thicknesses up to 90 mils can be obtained without run-off of the plastisol before it is fused. Spraying plastisols which do not sag before or during fusion have opened up new outlets for polyvinyl chloride resins.

Some of the largest steel producers are offering vinyl coated steel strip. This strip steel can be formed and embossed by the steel consumer. A combination of an excellent primer plus a plastisol of high tensile strength enables the coated strip to be drawn, punched or embossed without further finishing operations. Automotive panels, pressed metal boxes, refrigerator paneling, drip pans and office equipment are but a few of the outlets for vinyl coated steel. Manufacturers of metal outdoor furniture have seen the advantages of a durable, decorative coating, with a warm feel, and have begun to use sprayed plastisol on their product.

There are many finishing jobs where it is impossible to dip or flow coat plastisol, but where it is possible to spray and subsequently bake. Large wave guides approximately 12 ft in length have been successfully sprayed with plastisol, where prior to this time rubber sheets had to be bonded and subsequently cured in order to do the job.

Spraying plastisols have opened a new field to finishing, because large tanks and duct work can now be successfully coated with plastisol. It should be borne in mind that plastisols, by their nature, are insulating materials.

This insulation characteristic can be put to use to prevent condensation run-off or sweating tank problems. Silos have been coated with plastisols, because the vinyl coating not only resists the abrasive action of the ensilage, but also protects the steel or aluminum silo against the subsequent chemical action. Tank linings, in general, of all types are a natural for plastisol.

The versatility of plastisol dispersions makes their future horizons look bright. Many new techniques have been developed to utilize these dispersions to their best advantage. Producers of them feel that they have but scratched the surface in utilizing plastisols for the metal coating industry.

Robert F. McTague has been assistant technical director of The Stanley Chemical Company, a subsidiary of The Stanley Works, located in East Berlin, Conn., since June of 1956. Was appointed technical director on January 1, 1957.

Mr. McTague joined the chemical company as a chemist in 1940 and became research director in 1946.

He rose from private to first lieutenant in the U. S. Army Chemical Corps where he served as a member of a government research team during World War II. After his discharge he remained as chief chemist with the Rubber Reserve Corporation of the government.

A graduate of Holy Cross College, he also received an M.S. degree in chemistry there. He has completed postgraduate work at the University of Akron and Case Institute of Technology. He is a member of the American Chemical Society and the American Association for the Advancement of Science.

New Developments in the Field of Organic Coatings

by B. F. Ames*

In the majority of applications, primary emphasis must be placed on the protective aspect of finishes, since their other function—decorative—will not be permanent if either the finish or the metal or other substrate fails in service.

From the standpoint of protection, the job of the finish is to supply the properties that are lacking in the material to which the finish is applied. In recent years, a number of conditions—some perhaps transient, some certainly permanent—have arisen, which have placed new demands on manufacturers of metal, wood and plastic products. These conditions, in turn, have introduced new problems for the manufacturers of industrial finishes.

NEW FINISHING PROBLEMS

Since 1948, the tasks which organic finishes have been called on to perform have become increasingly varied and difficult. To cite a few instances:

Military requirements during the Korean War resulted in a shortage of such metals as copper, brass, nickel and chromium for civilian use. These metals, commonly used for their corrosion resistance and also for their attractive appearance, had to be replaced by substitute metals that provided a lower degree of corrosion resistance.

By and large, metals and woods were available for civilian use only in the lower grades and they had surface defects that needed to be concealed.

Organic finishes had to be developed to supply corrosion resistance for metals and to mask surface defects of both metals and woods.

MORE DEMANDS ON INDUSTRIAL FINISHES

Continuing trends in industry are also making new demands on industrial finishes. Applications of organic finishes in the aircraft industry are a case in point. Jet planes, to develop their full high speed potentialities, require an aerodynamically smooth skin which can be obtained by a finishing system that covers all metal surface defects. Temperatures encountered on the exterior surfaces of jet planes are extremely high, and even the erosive effect of raindrops and certain cloud formations at jet-plane speeds require careful study of finish performance.

Even in conventional types of planes, the transition from the temperatures encountered in high altitude flight to the heat and humidity of landing fields in tropical countries imposes new demands on organic finishes. Likewise in industry, coating materials for exposure to wide temperature ranges are in demand.

Radar installations and other electronic equipment used by the Armed Services frequently require protection against fungus growth.

In addition to meeting all these new finishing requirements, industry is looking for coatings that are adaptable to fast finishing schedules and result in low overall costs.

PART PLAYED BY RAW MATERIALS

In enabling the Armed Services and industry to meet all these new requirements, the manufacturer of finishes is assisted by the availability of a diversity of raw materials. Some of these materials have been introduced only within the last few years; others have recently become available in commercial quantities; still others, as production is stepped up, have become practicable from the standpoint of economy. Modifications of familiar raw materials have increased their range of adaptability to formulation of finishes.

In industrial finishes, the film-forming resins are of major interest. Among the resins which have either been recently introduced or which have been the subject of recent research leading to new applications, are the silicones, the vinyls, the epoxy types, the polyesters and the isocyanates. The familiar alkyd, phenolic, urea and melamine resins are now available in new modifications, particularly with the styrene copolymers of alkyd resins and phenolic resins. Chlorinated rubber has taken on new importance in a number of applications.

JOB OF THE FORMULATOR

It is the task of the formulator to evaluate all of these film-forming resinous materials in terms both of their end

* Vice President, Maas & Waldstein Co., Newark 4, N. J.

use and of their compatibility with other ingredients of the finish, such as plasticizers, pigments (if needed), and solvents. Selection of the other ingredients of a finish may be important if the full service potentialities of the film-forming materials are to be realized.

Some of the basic characteristics of the newer finishes summarized for each of the film-forming materials:

Silicones. The silicone resins, though they should perhaps properly be classed as semi-organic materials, so closely resemble the organics in their chemical structure that finishes incorporating them may be considered as organic coating. They are characterized by the ability to form films with excellent resistance to heat, weathering, humidity and salt spray. Silicone-based enamels are reported to be in successful use at temperatures of 500 F and even higher. Applications of silicone coatings include ovens, smokestacks, exhaust manifolds, kitchen ranges, boilers, furnaces, motors and chemical equipment.

Aluminum-pigmented silicone-base finishes are also reported to permit the use of ordinary steels where stainless would usually be required.

Because of their resistance to high temperatures, silicone-base finishes can be baked at higher temperatures, with a resulting decrease in baking time.

Resins produced by a chemical reaction between silicones and alkyds produce film-forming materials with heat resistance intermediate between the silicones and the alkyds and with better adhesion to metals than the silicones alone.

Vinyls. The vinyl resins form films that are tough, flexible and have good adhesion and offer excellent resistance to many corrosive chemicals. Vinyl films are also largely free from odor, taste and toxicity.

Finishes based on the vinyls are of three basic types: organosols, plastisols and vinyl solutions.

Organosols incorporate solvents; plastisols consist only of the vinyl resin in liquid plasticizers, with the addition of stabilizers, pigments and modifiers.

The organosols deposit films by evaporation of the solvents in the same manner as cellulose lacquers. The plastisols are intended chiefly for heavy coatings.

Applications of vinyl-based finishes include electroplating equipment, dish drainers, egg baskets and other farm utility items; hardware used in or near corrosive chemical baths; and cosmetic containers, such as compacts and vanity cases.

Epoxy Resins. One of the newest entries into the resin field, which came out of the pilot plant stage as recently as 1949—offering unusually interesting potentialities for the formulation of industrial finishes.

The epoxy resins form films that are odorless, tasteless and resistant to acids, alkalies, oils and solvents. Films have a high degree of flexibility and withstand deep drawing operations on metals that have been coated with them.

Surface coatings based on epoxy resins use a mixture of solvents, depending on the application. The first industrial use was as a washing machine primer and this is still the largest use. Uses include the coating of builders' hardware and collapsible tubes, lining of food cans and drums, the coating of magnet wire and for air conditioning equipment.

Modified Resins. Many of the time-established film-forming resins are currently taking on new importance as a result of research into modification of their properties through combinations with other materials.

Among the most promising of these new modified materials are copolymers of styrene with older resins like the alkyds. Styrenated alkyds, in particular, offer an unusual combination of properties. While retaining most of the basic advantages of the alkyds, finishes based on styrenated alkyds display drying characteristics that closely approach those of nitrocellulose lacquers. In addition, styrenated alkyd enamels generally provide a higher rate of build than cellulosic lacquers, and thus permit the use of fewer coats without sacrifice of drying speed.

The use of styrene copolymers with alkyd resins permits the formulation of clear films and pastel-colored enamels with high solids content and rapid drying time.

Phenols modified by the styrene copolymers display good color retention and have resistance to acids and alkalies.

Chlorinated Rubber. While not as new as a material for organic finishes, chlorinated rubber in the last few years has taken on added importance because of such properties as fast drying, chemical resistance and hardness. Typical applications include commercial laundry equipment, bottling machinery, and a variety of uses in the automotive industry.

SPECIFIC DEVELOPMENTS OF THE LAST FIVE YEARS

Within this broad framework of finishing progress since 1948, a number of specific developments are particularly worthy of note.

When many metals used both for their resistance to corrosion and for their attractive appearance came into short supply because of military requirements, new organic finishes came to the rescue.

One group was formulated to simulate the appearance of copper, brass, bronze, or gold. These finishes were quickly adopted by the manufacturers of such products as lipstick, shells, compacts, lamps, builders' hardware and similar items in which the public had come to expect the familiar appearance of gold, copper or its alloys. These finishes displayed a high degree of resistance to corrosive attack when applied to zinc or steel, and thus replaced the chemical resistance as well as the appearance of gold or the copper alloys.

Another finish was developed for application directly over zinc or steel as a substitute for brushed chromium plated appearance over which was applied a suitable clear protective coating. Related to this finish was another designed to give added durability to chromium plate applied directly over steel, without the customary underlying copper-nickel plating. Still another was specifically formulated for the protection of zinc die castings.

Perhaps the most recent of the new developments have been coatings based upon Polyester resins and the Isocyanates.

PROTECTIVE AND DECORATIVE FINISHES FOR METAL

Most of the simulated metal-type coatings are formulated to withstand salt spray and weatherometer tests of varying degrees, depending on the use requirements. While their original development was stimulated by the need to meet metal shortages, the fact that they permit production economies may result in their finding a permanent place in the metal-working field.

Clear finishes for the surface protection of metals, developed within the last few years, display exceptional resistance to chemical attack. An almost water-white lacquer, which can be applied to most metals, withstands salt spray and weatherometer tests for longer periods than ordinary lacquers. It forms a film that is exceptionally resistant to temperature variations, staining and perspiration.

A synthetic baking type finish, almost water-white in color, displays a very high degree of resistance to chemicals, is non-yellowing after prolonged exposure to heat and sunlight, and resists salt spray and perspiration. This finish can also be pigmented if desired.

FUNGUS RESISTANT FINISHES: STRIPPABLE COATINGS

Fungus-resistant coatings, developed primarily for the requirements of the Armed Services for military equipment used in the tropics, are now extending their field of utility. One new potential application is in the coating of wood frames which form the skeleton of refrigerated store fixtures and show cases to prevent fungus growth and consequent odors from mold and mildew.

The whole field of strippable coatings has taken on new interest. These coatings were originally used chiefly for protecting metal parts from corrosion or marring during storage and transit, but new developments have extended their field of utility. One new compound, applied to windows or other glass surfaces by brushing or spraying, masks the glass while the trim is being painted and is easily peeled off when the paint job is finished.

A second type is intended for the protection of surfaces finished with clear lacquers or lacquer enamels. It eliminates the need for corrugated board as a protection for the lacquered surface, and can be peeled off without danger of lifting the lacquer.

A third type forms a "cocoon" for the protection of bathroom fixtures and other products finished in porcelain. Made of a white strippable type of plastic, it protects the porcelain parts from chipping.

Hammered-effect finishes and wrinkle-enamel finishes are coming into wider use again because of their interesting decorative effects and because of their ability to hide scratches, weld marks and small defects in the metal.

Most recently have been the hammered-effect finishes in lacquer vehicles which produce the typical hammered pattern but which handle and dry like conventional lacquers.

MULTICOLORED TEXTURED FINISHES OFFER ATTRACTIVE EFFECTS

One of the striking advances in modern organic finishing in recent years has been the development of multicolored, textured coatings in which individual globules of different colored pigments are contained in a single vehicle. The finish is applied in a single spraying operation which produces a multicolored effect. The individual pigment particles retain their identity throughout the spraying operation and the drying process.

Multicolored textured enamels* can be applied directly to expensive woods or to cheaper grades of wood to simulate the effect of mahogany, marble or other fine materials, and will cover knotholes or other surface defects. On metals (usually after the application of a primer) it covers weld marks and other imperfections. These enamels are expected to find increasing use because of the opportunities they offer to use low-cost substrates with little or no surface preparation and because of its striking decorative qualities.

A GLANCE AT THE FUTURE: MORE PROBLEMS TO SOLVE

Both the manufacturers and users of industrial finishes hope, naturally, that the day may arrive when one single finish will meet all service requirements on all types of substrates. That day, however, is not in the immediately foreseeable future. But in the meantime, formulators of finishes will continue to study closely both the needs of the finishing industry and the new raw materials which be utilized to meet them more effectively. From this research will come new finishes that may be expected to offer combinations, to a greater degree than heretofore, of toughness, flexibility, chemical resistance, resistance to high and low temperatures, ease of application and low over-all finishing costs.

* Such as Plextone

Bertram F. Ames has been associated with Maas & Waldstein Co. since 1940. After his BS degree from New York University, Mr. Ames started his employment with the company in its Research and Development Laboratory.

He was subsequently promoted to the position of advertising manager and later to sales promotion manager, at which time he integrated the sales activities of the company's three factories in Newark, New Jersey, Chicago and Los Angeles.

When the company pioneered the field of multicolored paints, Mr. Ames became sales manager and later general sales manager, and was responsible for appointing a force of regional sales managers throughout the nation and in establishing a network of distributors throughout the United States, Canada, Mexico and the West Indies.

Presently, as vice president of the company, he coordinates the activities of all the products that his company manufactures in both its Industrial and Architectural Plextone Divisions.

He is on the board of directors on the New York Varnish and Lacquer Association and is chairman of its Industrial Product Finishes Group. He is also a member of the Finishes Division, Steering Committee of the National Paint, Varnish and Lacquer Association.

ORGANIC COATINGS IN METAL FINISHING

Types of Coatings Available and the Mechanics of Film Formation

by L. J. Nowacki*

The organic coatings industry of today produces in excess of 1½ billion dollars worth of coating materials yearly, or about half a billion gallons. Organic coatings are used for the same reasons as metallic coatings or platings, but have the versatility of use over many types of surfaces besides metals. They are used for decoration and protection of all kinds of articles and materials. They also aid in the fight against corrosion of metals which some experts have estimated causes several billions of dollars worth of damage each year. This tremendous coatings industry has developed very rapidly over a period of relatively few years. In 1921, the volume produced was less than one fifth of that produced today.

Scientific methods have been employed by the industry only since the beginning of this century, and it was not until after World War I that the industry really began to grow rapidly through science. Prior to 1900, varnish formulation was surrounded by secrecy, and varnish making was strictly an art. As late as World War I, organic coatings vehicles were made only from naturally occurring oils, resins and bitumens.

The tremendous developments that occurred in the organic coatings field since that time have come about as a result of the scientific development of resins or plastic binders for paints.

In the early part of the present century, it took from 2 to 4 weeks, or more, to finish an automobile. Mass production methods for producing automobiles were impossible because of the slow drying finishes. Then, the development of nitrocellulose lacquers revolutionized the industry. Cars could be given another coat of lacquer after the previous coat had air-dried for 30 minutes or less. The development of nitrocellulose lacquers also speeded the production of many other articles whose production had previously been slowed by the slow drying of their finishes.

In about 1926, phenolic and maleic resins were introduced. These were the first of the synthetic resins. They made possible the synthetic "four-hour-drying" varnishes. However, these varnishes did not weather as well as the

* Assistant Chief, Organic Coatings Research, Battelle Memorial Institute, Columbus, Ohio.

nitrocellulose automotive lacquers, so were not satisfactory for automobile finishes. Then about 1930, the alkyd-type enamels were marketed. They were made by chemically combining phthalic anhydride, glycerine and fatty acids.

The outdoor durability of these alkyd-type finishes surpassed that of nitrocellulose-type finishes. The inclusion of the alkyd resins in nitrocellulose lacquers also improved them so that, today, the durability of the lacquers approaches that of the alkyd enamels. The alkyd enamels, of course, do not dry as rapidly as the lacquers. Therefore, in assembly-line production, their curing is speeded by baking.

With the introduction of the urea resins in 1936 and the melamine resins in 1940, the way was open for further improving the baked alkyd finishes. These amino resins toughened the alkyd enamel films and improved their resistance to water, alkali, and soap solutions. Besides their use as automobile finishes, the amino-alkyds found application in the appliance field for refrigerators, washing machines, etc. Today, literally hundreds of the synthetic resins are on the market. Each type has its own specific properties, which lends to specific uses.

The advances in organic coatings were not limited to the improvements in their resin binders. Improvements and new developments were also made in the pigments and the solvents or thinners. Color, color retention, hiding power, weathering properties, and ease of dispersion of the pigments in paint vehicles were only a few of the properties improved in pigments. The development of commercial processes for producing a wide variety of inexpensive solvents was also highly important to the coating industry. Many of the synthetic resins could not be used economically without them.

Today, there is a class of organic coatings made for sale in paint stores throughout the country. These are called "trade-sales" products. There is another class of coatings known as the "industrial sales" products. Each industrial sales product is tailor made from the thousands of materials available to the paint formulator to do the job for which it is intended. The coating is formulated (usually with some compromises) to have the desired film properties and to fit the application and curing conditions that exist in the industrial plant.

CONSTITUENT PARTS OF PAINTS

Paints or organic coatings contain some kind of a film forming material known as the binder. The binder may be vegetable oil, varnish, or plastic materials. Unless the binder is a vegetable oil such as linseed, some solvent or thinner is necessary to make the paint fluid enough for application. The total liquid portion of the paint is the paint vehicle. The vehicle may be straight oil or solutions of the various binders. Some coatings are also produced as dispersions, such as vinyl organosols (vinyl micelles dispersed in hydrocarbons), or as water emulsions.

If the coating is required to hide the surface over which it is applied, or color is desired, pigments and fillers are used. Special mills are used to disperse the pigments and fillers into the paint vehicle. In addition, many types of additives are used in paints to speed drying, aid in wetting of the pigments, prevent skinning of the paint in the can, improve flow or leveling, prevent wrinkling or cratering of the film, and impart other desired properties.

CLASSIFICATION OF COATINGS

There are numerous ways to classify organic coatings but none are entirely satisfactory because, in any classification, one type of coating blends gradually into another classification without any clear line of demarcation. One form of classification might be made on the basis of the function that the coating is intended to serve such as primer, exterior enamel, alkali resisting coating, refrigerator white, etc. Another might be made on the basis of the appearance of the coating film such as smooth finish, pigmented finish, wrinkle finish, clear finish, etc. Still another might be made on the basis of the vehicle composition such as oleoresinous, phenolic, alkyd, vinyl, etc. However, one of the more satisfactory methods of classification is on the basis of the mechanism of film formation. There are four general methods of film formation: (1) solidification, (2) solvent evaporation, (3) oxidation, and (4) heat or chemical polymerization.

Films Formed by Solidification

Some organic coating films may be applied from hot-melts and then solidified by cooling. Thermoplastic materials in this category are waxes, polyamides, polyethylene, and bitumens, to mention only a few. The article to be coated may be dipped in the hot melt or, when coating flat sheets, the hot melt may be extruded into a thin film which is laid on the sheet.

Flame spraying is another method of application of the thermoplastic materials.

Film Formation by Solvent Evaporation

Most organic coatings are applied as solutions by brushing, spraying or dipping. The coating films are formed rapidly in many types simply by evaporation of the solvent leaving behind a solid film. The rate of drying is governed by the rapidity of the solvent release. However, the last few per cent of solvent usually evaporates very slowly so maximum hardness develops slowly. Forced drying is often used to develop the maximum hardness quickly.

The nitrocellulose lacquers dry by solvent release as do other cellulose derivative coatings, the vinyls, vinyl copolymers, the acrylic resins, shellac, styrene copolymers, solutions of bitumens and others.

The use of nitrocellulose lacquers for finishing automobiles and many other applications is well known. The vinyls and vinyl copolymers are noted for their excellent chemical resistance. Their uses include the lining of tanks and steel shipping containers. They are also used as maintenance coatings where they are subjected to chemicals and fumes.

Although the vinyl coatings dry simply by solvent evaporation, there are many applications as metal coatings where baking improves the bond between the vinyl coating and the metal. Vinyl resins used in the form of organosols or plastisols also require baking to fuse the dispersed particles into a continuous film. These vinyl organosols and plastisols find application as chemically resistant coatings including rack coatings for electroplating.

The acrylics, although thermoplastic, will withstand temperatures up to about 500 F without discolorization, so find application where resistance to high temperatures is needed. They are also excellent clear coatings for protecting bright metal against corrosion.

The styrene copolymer resins grew out of World War II. They find considerable use in paints for concrete and water-emulsion paints. However, they are also used in conjunction with other resins for finishing metals.

Film Formation by Oxidation

There are other coating materials that are liquids or soft sticky solids, which form films by oxidation-polymerization. Linseed oil and ordinary oleoresinous varnishes are typical of this group. Linseed oil finds large-volume usage as the vehicle in house paints. Linseed oil alone is less widely used as a vehicle in metal finishes. However, red lead in oil is still a commonly used primer for structural steel.

A straight oil vehicle is slow drying and produces comparatively soft films. Varnishes, on the other hand, contain natural or synthetic resins, usually cooked in the oils. The varnishes are faster drying and produce harder films than the oils alone.

The alkyd resin varnishes represent the largest of all our synthetic resin production. They are widely used both in "trade sales" coatings and industrial finishes. They are used as the vehicle in enamels for finishing almost half of the automobiles manufactured as well as for finishing washing machines, refrigerators, and many other metal items for both indoor and outdoor use.

The alkyds excel in outdoor durability. They also have excellent color retention. Of fairly recent development are the styrenated alkyds and silicone alkyds. The styrenated alkyds produce enamels that are faster drying than regular alkyds. They will dry tack free in from 2 to 4 hr. They also have better color, gloss, and chemical resistance than non-modified alkyds but at some sacrifice in outdoor durability and gasoline resistance.

The silicone resins improve the heat and chemical resistance of the alkyds. They also improve their weather resistance by virtue of the water-repellency characteristics they impart to the alkyds.

Recently, the epoxy resins were developed. Varnishes may be prepared from them by cooking them with oils. These varnishes have found acceptance as vehicles in enamels for finishing appliances because of their excellent color, adhesion, flexibility, and resistance to water, alkalies and cleaning solutions.

It should be emphasized that although the coatings in this group dry by oxidation at room temperature, they may also be baked. At temperatures above about 160 F, a change in the mechanism of film formation occurs and condensation and polymerization reactions become predominant, although some oxidation is still essential. Almost without exception, baking gives films better hardness, flexibility, chemical resistance and durability than does air-drying.

Film Formation by Heat or Chemical Polymerization

There are a number of coating materials which do not set or harden by prolonged exposure to air, but which do set when baked. These are the thermosetting or heat-convertible resins such as the phenolics, ureas, silicone and epoxy resins. When heated, they react with themselves to form larger molecules which cause the development of the hard infusible and insoluble coating film.

The phenolics have excellent resistance to most chemicals except alkalies. The epoxy resins are quite resistant to alkali, but do not have as much all-around chemical resistance as the phenolics. Since the phenolics produce comparatively brittle films while the epoxy resins produce flexible films with excellent adhesion, these two resins are now being used in combination to produce flexible films with chemical resistance only slightly less than the pure phenolics, but considerably better than the epoxy alone. This type of coating is finding considerable use as a lining for steel shipping containers. Products are now being successfully packaged for shipment in steel drums lined with these coatings that might otherwise require galvanized or stainless steel drums, wooden barrels or glass carboys.

An outstanding property of the silicones is their exceptional resistance to heat. The use of silicone resins to coat the armature windings in electric motors has increased the allowable operating temperature so that a very appreciable increase in horsepower output is obtained without increasing the size of the motor.

The urea resins are not used alone, but are used with alkyds to improve their properties, as has already been mentioned

UNDERCOATS

In many finishing systems, undercoats are needed for one or more of the following reasons: (1) to provide a bond between the metal and the second coat, (2) afford some inhibition to corrosion, and (3) to cover minor surface irregularities, and when sanded, produce a smooth surface over which to apply the finishing coat.

A primer may serve any one or all of these functions, and is the first coat applied in many finishing systems. However, if there is more than slight roughness in the metal, such as deep file marks, one or more coats of surfacer may be applied. The surfacer is highly pigmented to give good fill and have excellent sanding properties. A single undercoat known as a primer-surfacer combines the functions of the primer and the surfacer where conditions permit.

Certain pigments such as red lead, lead chromate, zinc chromate and other chromates act as corrosion inhibitors in primers. The chromates, however, do not act as inhibitors in acid environment.

Many types of vehicles are used in primers depending upon the requirements of the finish system. The oil vehicle in a red lead linseed oil primer produces a comparatively soft coating with only mediocre resistance to abrasion, scratching and gouging. Therefore, vehicles which produce harder films are needed for many applications. Such vehicles as the alkyds, urea-modified alkyds, phenolic varnishes, alkyd-phenolic combinations, epoxy esters, etc., find considerable use in primers and other types of undercoats and produce tougher films than linseed oil.

Primers and primer surfaces of the iron oxide-zinc chromate type with alkyd or phenolic modified alkyd vehicles are used with many of today's finishing systems for iron and steel. The iron oxide pigment is included for hardness, toughness, hiding and to improve the appearance of the enamel applied over it, the zinc chromate acts as a corrosion inhibitor, and various inert pigments such as clay, talc, asbestine, etc., are added to improve sanding properties, give "build" to the films, and to help prevent settling of the pigments in the paint can.

Recently, polyvinyl butyral wash primers have been developed for metals. These wash primers have excellent corrosion-inhibitive properties and they are sometimes considered as a replacement for the metal phosphate pretreatments. Some types contain zinc chromate pigment and phosphoric acid is added shortly before application.

Zinc dust primers are excellent for priming galvanized iron. They go a long way toward solving the problems of adhesion of organic coatings to new galvanized iron. The zinc dust in the primer helps prevent the formation of zinc formate at the zinc-paint interface, which is considered by many paint chemists to be the probable cause of adhesion failure.

Zinc chromate primers are the best known primers for aluminum-base and magnesium-base alloys. They provide an excellent bond between these metals and the finishing coat.

TOP COATING

The undercoats by themselves do not weather well nor do they have the pleasing appearance desired of most finishes. The topcoat must impart these characteristics, and together with the undercoat, must have the desirable toughness, abrasion resistance, water resistance, weathering resistance and other special properties needed in the finishing system.

The topcoat, as well as the primer, is formulated to meet the requirements of the particular service. The wide variety of materials available to the coatings formulator and the properties of many of them have already been mentioned. Mention has also been made of the types of topcoats used for automobiles, refrigerators and appliances. Space does not permit descriptions of all the other types of topcoats used on metals. However, a few interesting types can be described.

Aluminum paints have certain definite advantages for many applications. These paints may be made from a variety of vehicles including bitumens, bodied oils, various types of varnishes, and lacquers.

Ordinarily, the aluminum paints contain a leafing type of aluminum. The aluminum pigment is in the form of very small thin flakes which are specially treated to cause leafing. Some of these flakes float to the surface of the wet paint film and form an almost continuous metal leaf at the surface. The remainder of the flakes form more or less parallel layers throughout the film with a shingle-like effect. This arrangement of the flakes gives excellent shielding against the penetration of air, light, and moisture. When selecting a vehicle for an aluminum paint, care must be taken to pick one which does not destroy this leafing effect.

Because of the moisture-proofing efficiency and good durability of aluminum paints, they are widely used for the protection of structural steel. Steel bridges, for example, maintain good appearance for a long time when coated with aluminum paint. The paint also has good visibility when illuminated by automobile headlights.

The painting of oil storage tanks with aluminum paint has cut down on evaporation losses over those from dark colored paints, because of the high light reflectance of the aluminum paints which keep down the temperature inside the tank. This same property also increases their value as a paint for metal roofs and metal buildings.

Another valuable application of aluminum paints is on heated surfaces. When the proper heat-resisting vehicles are used, these paints protect the metal surface for long periods, while retaining their silvery color.

Aluminum pigments are also used in the polychrome metallic finishes, one type being the "glamour finishes." However, non-leafing types of aluminum pigments are used in these finishes. These topcoats may be either clear or colored by pigments. Their vehicles are either lacquers or enamels.

The glamour finishes possess the attractive optical effect of changing shade and color when viewed from different angles and seem to have great depth. This effect is caused by light reflection from the aluminum particles. They have the general appearance of a smooth, colored enamel with a metallic luster.

They have found extensive use as automobile finishes, both on the exterior and for interior metal trim.

Another important class of the polychrome metallic finishes is the textured coatings which have a smooth surface, but appear to have many fine craters or indentations that resemble hammer marks in metal. The apparent texture of these coatings may be varied from a size that resembles peen hammer blows on metal down to that of a closely etched surface. The pattern of this texture can be controlled by the spray operator. In general, thicker wet coats give a coarser pattern than thin coats.

The pattern in the older hammer finishes was obtained by applying a polychrome base coat, and while it was still wet, spraying on a mist of fine droplets of thinner from a spatter gun. The droplets of thinner produced the appear-

ance of indentations in the coating. Hammer finishes are now available for application by a single spray gun. The pigment particles swirl around in the wet paint film and arrange themselves in the hammer pattern that duplicates the effect of the spatter gun.

The hammer finishes are used on business machines, office equipment, vacuum cleaners, metal cabinets and many other metal articles because of their pleasing appearance. They also have the advantage of hiding minor surface blemishes in the metal.

Wrinkle finishes are coatings which form an uneven surface of fairly regular pattern as contrasted to the ordinary smooth finishes. In spite of the wrinkled surface, the film is continuous so these coatings are protective as well as decorative.

Thick films of tung oil and undercooked tung oil varnishes tend to wrinkle when cured, especially when baked. It was found that this wrinkling could be controlled to produce attractive finishes. More recently, wrinkle finishes have become available, which are of more normal film thickness and made without tung oil. The wrinkle texture is controlled by composition of the coating, processing, and application factors.

Wrinkle finishes are used for their decorative appeal and to cover imperfections in metal surfaces. They are often used to cover the roughness of casting, for example, sewing machine heads. They find use on office equipment, typewriters, adding machines, instruments and on many other articles.

Luminescent coatings are becoming increasingly popular for signs and decorations. These coatings convert radiant energy of short wavelength (such as black light) to visible light. They may be subdivided into two types: (1) fluorescent coatings and (2) phosphorescent coatings. The fluorescent coatings emit useful light only during activation by black light, their afterglow being of no practical duration. The phosphorescent coatings glow when activated by short-wave visible as well as black light, and continue to glow for appreciable intervals after the exciting light source is extinguished. Some phosphorescent coatings have a high brightness for the first few minutes after excitation with a short afterglow while others have relatively low brightness shortly after excitation with a useful afterglow of several hours.

There are a number of fluorescent and phosphorescent inorganic pigments from which the luminescent coatings can be made. Zinc sulfide, combined zinc and cadmium sulfide, and strontium sulfide are among the most practical ones. A range of fluorescent colors extend from green through yellow, orange, and deep red. However, the color of the pigments in visible light does not correspond to their fluorescent color so dyes or tinting materials are often added to modify either the color in visible light or the fluorescent color. The range of phosphorescent colors is small; green, yellow, orange, and violet-blue. Fluorescent organic dyes are also used in the luminescent coatings. They include rhodamine, thioflavin and auramine. The oil soluble types are chiefly oleates or stearates of fluorescent basic dyes.

The fluorescent coatings are finding application on "black lighted" outdoor billboards and interior murals of theaters and night clubs. The phosphorescent coatings too are useful in the novelty field, but they also have a practical value as markers for exits, directional signs, etc.

There is another type of coating, which is quite often confused with the luminescent coatings. This is the glass-beaded coating, which has a layer of very small glass beads partially imbedded in the surface of the coating. The brilliancy of these coatings is caused by the reflectance of light by these glass beads. The glass bead coatings are used on metal signs, as well as on movie screens, and highway markings.

The discussion of topcoats and coatings in general could continue ad infinitum. Innumerable paint formulations have been developed for specific uses and new ones are being added every day. This tremendous development of the paint industry has occurred and is continuing because of extensive research. Besides the continuous development work by the industry to produce better coating formulations, research is going on in many other areas. Many investigators are working along basic or fundamental lines to add to man's knowledge of the factors affecting the performance of paints. Others are developing new resins, plastics, pigments, solvents, additives and other constituents of coatings. Still others are working less directly in the development of coatings by conducting research to find uses for new chemicals or by-products in the paint trade. Many users of paint are also contributing to the progress in coatings technology by their own research and development programs designed to give them better finished articles. All this points towards continued growth and improvement in the coatings industry.

L. J. Nowacki is assistant chief of organic coatings research at Battelle Memorial Institute, Columbus, Ohio.

Since joining Battelle in 1946, he has been associated with numerous organic coatings research and development programs. These programs have included the development of special coatings for many types of end uses and the utilization of new raw materials in paints. Prior to joining Battelle, he spent two years with Lowe Brothers Company, 1940-1942, and four years' active duty as a Naval Reserve Officer in World War II. He obtained his BChE and MS degrees from Ohio State University.

COLOR DIFFERENCE SPECIFICATIONS

by Henry Hemmendinger and Hugh R. Davidson*

Of the many coordinates which have been proposed to describe color space, two systems are outstanding: The Munsell and CIE coordinates. Transformations between these two systems are readily carried out, and these coordinates, or others derived from them, form the basis of all systems of color-difference specification which have been extensively used.

I. GENESIS OF COLOR SYSTEMS

The Munsell Coordinate System

The Munsell system was originally derived solely on a visual basis. Recognizing early in this century that color requires three dimensions for its description, A. H. Munsell proposed that the three dimensions of color space be chosen as a cylindrical coordinate system. The axis of the cylinder, corresponding to the gray series, he described as Value. With his early collaborators, he visually selected nine equidistant gray steps, between white and black, to define the scale of units of the value coordinate. As a second coordinate, he chose the angle (from an arbitrary reference) about this axis. The total distance around any element of the cylinder he called the Hue circle, which was divided into a series of one hundred perceptually equidistant steps, or hues. Finally, the third Munsell coordinate is Chroma, and represents distance from the gray axis along any line of constant hue. Like the other coordinates, the chroma scale was established by Munsell in such a way that, as one progresses along any line of constant hue in a plane of constant chroma, colors characterized by the same chroma difference appear to be visually equidistant. Moreover, he chose all three of these coordinate units in such a way as to provide, to the best of his ability, constancy of visual significance of the steps even in comparing colors at widely different points of color space.

After this system was completed, as exemplified by the 1929 edition of the Munsell Book of Color, it was apparent that Munsell and his collaborators had to a large part succeeded in their objectives, but that improvements could be made. The possible improvements were determined, with the aid of an extensive body of visual and instrumental observations, by the Committee on the Spacing of the Munsell Colors of the Optical Society of America, and their conclusions were published[1] as an improved redefinition of the Munsell coordinates, called the Munsell renotation coordinates. Although several collections of colors exemplifying the Munsell renotation colors have been privately made, there has until now been no generally available edition of the Munsell Book of Color according to the renotation specifications. Such a volume†

* Davidson and Hemmendinger, Easton, Pennsylvania.

† By the Munsell Company, of Baltimore, Maryland.

will, however, be made available (in glossy colors) during the present year.

The CIE Coordinate System

The purpose of the definers of what has now been generally adopted as the CIE system was quite different from that of Munsell: They sought a means of specifying color which could be carried out by purely objective means. To this end, those aspects of color which are intrinsically subjective (the characteristics of the observer) were embodied in a definitive description of the "standard" observer. With the aid of this definition, and with a description of the energy content of the illuminating source and of the reflectance of any sample throughout the visible spectrum, it becomes possible to determine three quantities, called the tristimulus values X, Y, and Z. These tristimulus values state the quantities of three hypothetical primary lights which, when superposed on a total-reflecting screen, will appear to the standard observer to be identical to the sample. It is convenient to define the chromaticity coordinates $x = X/S$, and $y = Y/S$, where $S = X + Y + Z$, and then to use the three coordinates Y, x, y to define the usual form of CIE space. The x and y coordinates are plotted in one plane as Cartesian coordinates, and the Y coordinate defines the third axis perpendicular to the x, y chromaticity plane. All possible colors fall within certain limits in this color space.

Thus, from the nature of its definition, the uniformity of perceptual differences of the Munsell coordinates is not to be expected in the CIE color space, and no such uniformities are found. The definition of the Y coordinate is based on the luminosity function describing the human eye, so that the Y coordinate defines the luminous reflectance, or lightness, of the sample, and it is directly related to the Munsell value coordinate. In the chromaticity plane, the visual appearance of color differences can best be determined empirically, and a very comprehensive series of observations to determine the visual significance of chromaticity differences has been carried out by MacAdam and his colleagues at the Eastman Kodak Company.[2]

The entire concept of uniformity of color differences is presently under study by the Committee on Uniform Color Scales of the Optical Society, in a project[3] which will extend over a number of years. This committee is making use both of the earlier work on the Munsell renotation, and of other studies such as those of MacAdam, to define a means of sampling color space to obtain visually equidistant colors. This sampling is in turn being tested and evaluated by extensive visual observations, so that, out of a series of successive approximations, a still more uniform color space than any yet defined will eventually be at hand.

II. COLOR DIFFERENCE EXPRESSIONS

In view of the constancy of visual differences which was sought in the definition of the Munsell Coordinates, it is immediately apparent that very simple means can be used to define the size of color differences, or to establish color tolerances, in this space. Several of the early expressions for color differences (Nickerson[4] and Balinkin[5]) were based on linear or quadratic sums of Munsell coordinate differences. Although these particular relations are rarely used today, the use of Munsell coordinates provides a very simple means of defining color tolerances and is of sufficient accuracy for many purposes. Thus, the Munsell Company describes two colors as conforming to one another within Munsell AAA tolerance if the colors differ by not more than 0.05 value step, not more than 0.2 chroma step, and not more than 2/C hue steps (where C is the chroma designation). Additional details of this method of designating tolerances are given by Judd.[6]

In the search for more refined means of describing color differences, it has generally been useful to resort to objective color specifications. The earliest efforts along these lines were based on the search for modifications of the x, y chromaticity plane, especially modifications which could be derived simply. One of the first of these was the r, g transformation proposed by Judd.[7] The coordinates r and g are chromaticity coordinates which are derived by elementary mathematics from the CIE chromaticity coordinates x and y. The definition was intended to be such that, in the new r, g chromaticity plane, colors which appear equally distant from a central color should have chromaticities lying on circles about the central color, rather than on ellipses as in the CIE x, y space. A definition of color differences prepared by Judd on the basis of the r, g coordinates provided the original description of the National Bureau of Standards (NBS) unit of color differences.

It was soon recognized that the r, g coordinate system did not, in fact, provide a sufficiently uniform chromaticity plane, and a similar transformation to the α, β space, was proposed by Hunter.[8] This was adopted by Judd as the basis of the redefinition of the NBS unit, which is currently defined in terms of the α, β coordinate system (Judd[9]).

The reliance, in the foregoing definitions, on simple transformations of CIE chromaticity space, is not dictated by any physical or psychological laws. It has, in fact, been shown by MacAdam[10] that the empirical data on the perception of chromaticity differences cannot be represented by any such simple transformation of the chromaticity plane. It is therefore appropriate to consider other more complex transformations of CIE space. One such transformation was proposed by Adams,[11] and has become the basis of the commonly used color-difference notation according to Adams' chromatic value space. This space is derived from the CIE tristimulus values X, Y, Z, using relations for each of the tristimulus coordinates analogous to the relation between luminous reflectance Y and Munsell value as derived by the Optical Society Committee on the Munsell renotation. Adams' proposal for this transformation was based on his theory of color vision. Although his theory has never been widely accepted by students of color vision, the transformation of CIE space based on it provides a quite good

approximation to a uniform color space, and the Adams' color-difference formula, with normalizing factors proposed by Nickerson and Stultz[12], has been widely used.

Many other analytical transformations of CIE space have been proposed, some of which have considerable merit. (For a more complete review, see Judd.[13]) To many workers in this field it has, however, appeared excessively arbitrary to base the specification of color differences on a simple mathematical transformation of CIE chromaticity space, or on a more complex transformation which is based on very problematical hypotheses regarding the fundamental nature of color vision. An alternative course is available through the use of the empirical data on perceptibility of color differences accumulated by MacAdam and his co-workers. These observations provide information permitting one to directly relate the difference in chromaticity coordinates of two samples to the visual perception of size of their color difference. Although the MacAdam observations were made for particular viewing conditions, it has been shown by Ingle and Rudick[14] and Davidson and Friede[15] that their results are applicable to observations of reflecting samples under quite different observing conditions. The MacAdam data have been derived from observations over a wide range of colors, and constitute an empirical mapping of the visual sensitivity to chromaticity differences at each of a large number of regions of color space. The other definitions of color difference which have been discussed involve the use of basically simple assumptions regarding the nature of color space, but by this token also permit less flexibility in conforming to all available visual observations. Under these circumstances, it is to be expected that evaluations of color differences conforming more accurately with visual observations can be best obtained by methods based on detailed calibrating data, such as that obtained by MacAdam and his colleagues; these data may be further supplemented, if necessary, by such modifications as have been shown appropriate for particular conditions of observation.

III. PRACTICAL WORKING METHODS

The selection of a means of describing color differences often depends in practice on the convenience with which the calculations can be carried out rather than on their relative accuracy. Therefore, some of the computing methods and aids which have been used for any of the color difference formulae discussed above should be considered. First, a brief review is given of the instrumental procedures for determining color specifications in any of the coordinate systems.

Instrumentation for Objective Color Measurements

Basically, from the definition of the CIE system, it is necessary to use a spectrophotometer to analyze the physical characteristics (reflectance or transmittance) of a sample throughout the visible spectrum, and then to make appropriate calculations to obtain the CIE color specifications. With the aid of a recording spectrophotometer and of available techniques for high speed computation (either analogue or digital), such methods are quite practical and are widely used both in development projects and in production control, if a large number of samples is to be measured.

Less expensive (and, if possible, faster) equipment is greatly to be preferred for many problems, and for this reason the simpler filter photometers are widely employed. In some cases these are intended to measure directly in the CIE system; in others the instruments are designed to measure some other coordinates, such as one of the alternative systems described in Section II. In considering the application of filter photometers, it must be recognized from the outset that, of the instruments which have been described in the literature, each is claimed to provide an *approximation* to the desired coordinate. This approximation is good enough so that there are very many types of problems to which they can advantageously be applied. On the other hand, there are types of problems for which none of them is adequate.

In general, filter photometers are of limited use in problems involving the measurement of color differences of samples which look nearly the same, even though they have widely differing spectral properties. (Such samples are called metameric colors.) Conversely, filter photometers are most useful in problems involving spectrally similar samples.

The errors of filter photometers arise from the fact that each instrument involves the use of at least three source-filter-photocell combinations. Even on a manufacturer's prototype model, it is impossible to choose the components in such a way as to provide as accurate a measurement of all colors as can be derived from spectrophotometric data. Production models of any commercial instrument are in addition subject to the intrinsic variability of the components (especially the phototube), which can at best be only partially compensated by selection and balancing of other components. The intrinsic variability of properties of photocells has in the past been so great that this source of variation, in the measurement of moderately metameric samples, might easily lead to variations between two instruments far greater than the variation in interpreting the results according to the different color-difference formulas discussed in Section II. For this reason, it would be futile to elaborate at length on the relative merits of different formulae for determining color difference, without first considering how accurate are the available color measurements. The accuracy of a filter photometer, in turn (for reasons implied above in the discussion of source-filter-photocell selection), depends on the spectral characteristics of the samples to be measured. It is therefore impossible to state exactly what the accuracy of a filter photometer will be, without some consideration of the characteristics of the samples to be evaluated. An instrument which has been found to be of ample accuracy for one type of problem may be quite inadequate for another. For instance, the measurement of high chroma red samples is one imposing very great demands on the accuracy of the measuring instrument, and an instrument which has proved adequate in other regions may grossly

misinterpret both the direction and the size of color difference between two high-chroma reds. Moreover, the evaluation of accuracy of a particular instrument cannot be done once for all for a given color region. An instrument may, for instance, correctly evaluate grays in which carbon black is the main pigment, but may be significantly in error in evaluating grays composed of mixtures of colored pigments. This characteristic of certain types of color-measuring instruments cannot be overemphasized, since errors arising from these effects are often much larger than the differences arising from evaluation of the measurements by one or another of the several possible color-difference formulas.

If it has once been decided, for reasons of economy or convenience, to use an approximate color-measuring instrument, then the choice between the several color-difference formulae can likewise appropriately be made solely on the basis of economy and convenience (in terms of ease of computation with the available facilities). For samples which are not excessively metameric, the use of a single instrument and a single color-difference formula will generally give useful results. Production-control problems can frequently be limited to circumstances involving little metamerism, and in these problems filter photometers may offer as much accuracy as any instrument can, with a great saving in both equipment cost and operating time relative to alternative methods. Color-differences measured by several different approximate instruments may, however, not agree adequately with one another, and the discrepancy between the two instruments will be greater, the greater the metamerism of the samples. In the last analysis, therefore, the decision on the appropriateness of using any type of instrument in a given problem must depend on the following factors: On the spectral character of the samples to be evaluated, on the accuracy (with respect to the samples) of the available instrument or instruments, and on the accuracy and precision with which the color differences are to be evaluated.

1. Visual Methods

With the aid of visual observations of a sample relative to the Munsell Book of Color, it is possible to interpolate with moderate accuracy, and thus, for instance, to apply tolerances expressed in Munsell coordinates. For tolerances as close as the AAA tolerances described above, however, the accuracy of visual interpolations is not adequate, and the increased accuracy of instrumentation is required.

The accuracy of visual interpolation could be increased if a collection of colors were available with smaller intervals between steps. Existing editions of the Munsell Book of Color contain more than 1,000 samples, and an edition with half the spacing in each of three coordinates would therefore contain about 10,000 samples. Still closer spacing would be desirable, but even a collection of 10,000 colors becomes economically impractical. An alternative solution, based on a selective sampling of color space, rather than a uniform sampling, has recently been made available. This involves the preparation of a selected group of color standards, and of samples differing from them (in the directions of each of the three Munsell coordinate axes) by small and equal color differences. Such a collection, with color difference descriptions based on MacAdam's data, has been described by Hemmendinger and Davidson[16] and is available from Munsell. In its present form (with only twenty central colors), it is intended primarily to illustrate the magnitude of the stated color differences. Samples of this type can be used to permit accurate characterization of color differences by visual interpolation, if a special series is constructed about each point in color space at which the color difference evaluations are desired.

2. Graphical Methods

Graphical procedures to simplify the determination of MacAdam units of color difference have been described by Davidson and Hanlon.[17] A similar but more extensive collection of graphs has been prepared privately by W. Goodwin and F. Simon, of the Union Carbide and Carbon Company.

3. Slide Rules

Slide rules to facilitate the computation of Adam differences have been described by Glasser and Troy[18] and by DeJager.[19]

4. Digital Computing Aids

Tables have been published by Nickerson[20] to facilitate the calculation (with a desk calculator) of Adams color differences from CIE coordinates.

If the color difference calculations are to be made with the aid of a high-speed digital computer, computations of NBS units make the fewest demands on the memory of the computer. Methods for the computation of Adams' color differences with punched card calculators have been discussed by Opler, Meikle, and Charlesworth[21] and by Allen and Chow.[22] MacAdam[23] has discussed the problem of computing MacAdam color-difference units with punched card calculators.

5. Electrical Analogue Computers

Although a very high accuracy is frequently required in the measurement and computation of color specifications, no more than two significant figures can be usefully employed in the end-result of color-difference computations. It is therefore entirely appropriate to use relatively simple electrical analogue computing equipment for these computations, provided a suitable source of color specifications is available.

In the case of one commercially available instrument, the analogue computer is an integral part of the filter photometer, so instead of reading tristimulus values, one can read out directly the color difference between two samples. Such an instrument provides a very convenient and rapid means of measurement, and has many useful applications, especially within a single laboratory. Since it is necessarily associated with a particular filter photometer, however, the use of such a source of color-difference measurements must be approached with caution, in order

that one may be sure that the filter photometer is appropriate for the problem at hand. In view of the limitations of such a photometer, it does not appear appropriate to describe the color-difference measurements resulting from such measurements as "NBS units of color difference," since a sequence of approximations is necessarily involved both in the measurement and in the calculation.

Other analogue computers, instead of being an integral part of a particular photometer, are designed to accept tristimulus data derived from any measurement, and transform them to color differences according to one of the formulas discussed above. This approach offers certain advantages, since the computer can be used with data derived from whichever color-measuring instrument is most appropriate for the problem at hand. This field is a rapidly growing and a promising one; complete information is not yet available on some of the instruments most recently announced, and no attempt will therefore be made at this time to give details of the available equipment for analogue computations.

IV. THE FUTURE

All of the foregoing methods of color-difference computation have found application throughout the past decade, and it is to be expected that all will continue to be used throughout the coming decade. There is a moderately good correlation between color-difference specifications derived by the different methods, and the selection of one or another has in general been based on operating convenience rather than on their accuracy in the sense of conformance with visual observations. In the opinion of the authors, color-difference evaluations based on the MacAdam observational data offer a marked superiority over the other methods if conformance to visual observations is the determining criterion. This is especially true since the computation of MacAdam units of color difference is readily adjusted to the needs of each application, such as a weighting of lightness vs. chromaticity variations appropriate to the texture and conditions of viewing of the particular samples being judged. In general, the reporting of data in "NBS units" has been rather more common in the past than in MacAdam units. It is probable, however, that this preference has been based in part on the weighting attributable to a unit which is named after the National Bureau of Standards, a weighting which has not always been justified in view of the many approximations which have sometimes been made in the measurement and computation of the necessary color specifications.

The Committee on Small Color Differences of the Optical Society of America expects to complete its work within the next decade; its studies will undoubtedly greatly improve our understanding of what constitutes a uniform color space. The successful conclusion of this work will permit a more definitive proposal of means of evaluating color differences than is presently available. Pending the completion of that work, all the methods described above will continue to be used, and the choice between them will depend both on operating convenience and on the importance attributed to deriving a unit offering the best correlation with visual judgments.

REFERENCES

[1]S. M. Newhall, D. Nickerson, and D. B. Judd, J. Opt. Soc. Am. **33,** 385 (1943).

[2]D. L. MacAdam, J. Opt. Soc. Am. **32,** 247 (1942). W. R. J. Brown and D. L. MacAdam, J. Opt. Soc. Am. **39,** 808 (1949).

[3]D. B. Judd, J. Opt. Soc. Am. **45,** 673 (1955).

[4]D. Nickerson, Textile Research **6,** 509 (1936).

[5]I. A. Balinkin, Bulletin Am. Ceram. Soc. **20,** 392 (1941).

[6]D. B. Judd, Color in Business, Science, and Industry, p. 276.

[7]D. B. Judd, J. Opt. Soc. Am. **25,** 24 (1935).

[8]R. S. Hunter, Bulletin Am. Ceram. Soc. **19,** 133 (1940).

[9]D. B. Judd, Color in Business, Science, and Industry, p. 258.

[10]D. L. MacAdam, J. Opt. Soc. Am. **33,** 18 (1943).

[11]E. Q. Adams, J. Opt. Soc. Am. **32,** 168 (1942).

[12]D. Nickerson and K. F. Stultz, J. Opt. Soc. Am. **34,** 550 (1944).

[13]D. B. Judd, Color in Business, Science, and Industry, pp. 224–277.

[14]G. W. Ingle and L. Rudick, J. Opt. Soc. Am. **43,** 501 (1953).

[15]H. R. Davidson and E. Friede, J. Opt. Soc. Am. **43,** 581 (1953).

[16]H. Hemmendinger and H. R. Davidson, J. Opt. Soc. Am. **44,** 350 (1954).

[17]H. R. Davidson and J. Hanlon, J. Opt. Soc. Am. **45,** 617 (1955).

[18]L. G. Glasser and D. J. Troy, J. Opt. Soc. Am. **42,** 652 (1952).

[19]D. DeJager, J. Opt. Soc. Am. **46,** 383 (1956).

[20]D. Nickerson, Am. Dyestuff Reporter **39,** 541 (1950).

[21]A. Opler, R. W. Meikle, and M. J. Charlesworth, J. Opt. Soc. Am. **43,** 550 (1953).

[22]E. Allen and W. M. Chow, J. Opt. Soc. Am. **44,** 349 (1954).

[23]D. L. MacAdam, J. Opt. Soc. Am. **47,** 122 (1957).

Dr. Henry Hemmendinger received an AB degree in 1935 and AM in 1937 from Harvard University, and his PhD from Princeton University in 1939. He was Bausch and Lomb Fellow at M.I.T. 1939–1941 and participated in NDRC Research at the University of Rochester 1942–1944. During 1944–1945, Dr. Hemmendinger was associated with the Operations Research Group of the US Navy. From 1946–1952, he was employed as a physicist at the General Aniline and Film Corp., Easton, Penna. Dr. Hemmendinger has been a partner in Davidson and Hemmendinger since 1952.

Hugh R. Davidson received a BS degree from Lehigh University in 1941 and was associated with the Operations Research Group of the US Navy from 1945–1946. Mr. Davidson was employed by the General Aniline and Film Corp. as a physicist from 1946–1952. Since 1952, he has been a partner in Davidson and Hemmendinger.

SELECTING AND TESTING FINISHING MATERIALS

by H. P. Wertman*

Qualities to be considered in selecting an organic finishing material and some of the instruments used in testing for these various properties are introduced in this paper. Subsequent papers are planned to cover many of the phases in complete detail—Ed.

THE FIRST IMPRESSION of a product can create or lose a sale; therefore, the proper selection of finishing materials becomes equally as important as other engineering requirements. A good finish protects and gives enduring life to a product; it creates eye and sales appeal.

In organic finishing, it is most important to evaluate or enumerate the functions which are expected of the finish in relation to the end use of the product and, as a guide, the following factors should be considered:

1. The Finish—protective, decorative or both.

2. Types of exposure:
   - A. Indoor
   - B. Outdoor (Climate—tropical, sub-tropical, Northern hemisphere, etc.)
   - C. Atmosphere (Rural, industrial, corrosive, salt air, etc.)

3. Physical Requirements:
   - A. Color
   - B. Gloss
   - C. Hardness
   - D. Abrasion
   - E. Flexibility
   - F. Impact
   - G. Heat Resistance
   - H. Corrosion Resistance
   - I. Solvent Resistance
   - J. Cold Check
   - K. Humidity
   - L. Color Retention
   - M. Gloss Retention
   - N. Adhesion

4. Chemical Resistance:
   - A. Acid—Type and concentration
   - B. Alkali—Type and concentration
   - C. Fumes—Immersion or splashing

5. Application Methods to be Used:
   - A. Pretreatment prior to finishing
   - B. Air drying
   - C. Baking and type (Convection oven, infra red oven, etc.)
   - D. Time and temperature
   - E. Methods of application
     1. Brushing
     2. Flow Coating
     3. Roller Coating
     4. Tumbling
     5. Whirling
     6. Dipping (Manual or Automatic)
     7. Spraying (Manual or Automatic)
     8. Electrostatic Spraying
     9. Hot Spraying
     10. Airless Spraying
     11. Steam Spraying
     12. Other

6. Number of Coats

7. Specification Writing:

The most practical and economical specification is a performance requirement. The selection of raw materials should be left to the discretion of the finishing supplier to furnish the most economical materials to meet the needed physical requirements.

In drawing up the performance requirements, a weighted method is suggested to place emphasis to each requirement, considering the end use of the product.

Final selection must be based on the degree to which the overall requirements are met in their relative importance, along with the unit cost of finishing materials to protect against the selection

*Technical Service Director, The Glidden Company, Eastern Industrial Department, Reading, Penna.

of a material which is based principally on the cost per gallon being vended.

It is important that each material is tested at the proper film thickness required to meet the physical and chemical resistance expected, which influences the cost per square foot of finishing materials and still meets the production handling requirements.

TESTING AND EVALUATION OF FINISHING MATERIALS

The degree of testing and evaluating organic coatings is dependent upon personnel available and the plant size and quality product being produced. Direct measurement of the properties of the finished film usually involves destructive tests, since the properties of the applied film depend on the composition of the finishing material and on the conditions of application and cure. Many times this method is time consuming and prohibitive; therefore, instrumentation becomes a means to control the properties of finished films without resorting to destructive tests. In evaluating materials for initial selection or additional suppliers, it is necessary to test all samples for meeting all requirements. However, it is not necessary to run all tests for checking production quality control. All testing must be conducted on properly prepared substrates and under controlled methods of application and testing. All finishing materials should be checked for the following which will save much lost production time and requires little expense in testing equipment and time:

1. Viscosity (Consistency)
2. Weight per gal
3. Color
4. Gloss
5. Adhesion (A knife test of the panels prepared for color and gloss)

Coverage and uniformity also may be observed by visual examination for build-ups or thick edges or thin or bare spots, or can be determined by instrumentation. Such measurements usually are made in areas which are critical from the standpoint of application, service or appearance.

Commercial equipment is available for measuring thickness by non-destructive means or organic coatings applied to parts fabricated from ferrous materials. The operating principle of these instruments is the measurement of the electrical impedance with a ganging head in a magnetic circuit as it varies with the length of gap formed by the non-magnetic finish coating. Other methods of measuring thickness are used where the basic metal is non-magnetic and the most common of these is direct micrometer measurement but while a small area of the finish must be removed, this can be touched up readily. Other methods for thickness measurement are available but are limited in use.

All tests of the specification must be run by the destructive or proper instrumentation selection. The following instruments are commonly used for test purposes:

Color can be tested by visual examination, and by the use of color and color difference meters, and spectrophotometers.

Gloss may be determined visually and with a glassometer and/or reflectometer.

Flexibility tests are made with conical mandrels, flexibility testers, and mandrel sets for paint flexibility composed of nine plated cold rolled steel rods with $\frac{1}{8}$ 1 in. diam.

Abrasion by the falling sand method or the grit blast abraser.

Hardness may be determined by the pencil or penknife tests, print tester or one of the test instruments.*

Corrosion—The Salt Spray—A.S.T.M. Specification B117-54T (Tentative)

Humidity—100 per cent Relative Humidity at 100 F.

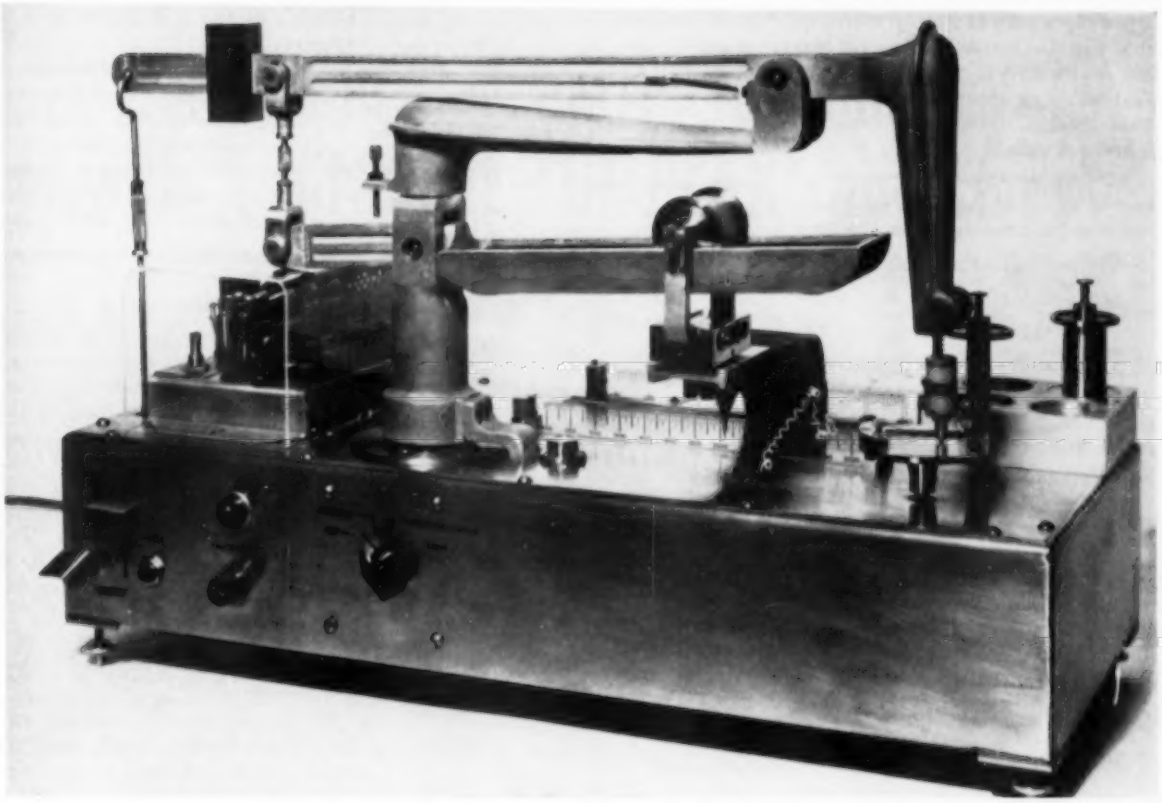
Chemical Resistance—Tested for resistance to specific chemicals where the property is required and where the actual end use will be by spot testing, immersion or fumes.

All testing must be designed to simulate as closely as possible actual operating conditions and must be tests which are reproducible so that it is not necessary to run control samples and tests of comparative type. If the conditions are such that there are any questions concerning test results, control samples can always be included in any test work.

It is important to control the quality of the finishing material. It is good practice to determine its quality by testing both as received liquid and a film of the material applied and cured on a standard test panel. Cured film tests can be made rapidly and reliably with standardized testing equipment according to a standardized procedure and then there is no loss of product due to use of substandard materials.

* Such as Sward Hardness Rocker, Hoffman Scratch Hardness Tester, Gardner Pocket Type Adhesion Tester.

Howard P. Wertman is 39 years of age and a graduate of Wyomissing Polytechnical Institute, Wyomissing, Pennsylvania. He received a special appointment with The Glidden Company, Reading, Pennsylvania, 20 years ago and has worked in every department, paint grinding, paint thinning, paint testing, pigment, varnish and lacquer manufacture. He was later transferred to the laboratory as a paint formulater. Upon the completion of four years of service in the European Theatre during World War II, he returned to Glidden and in 1948 was appointed technical service director, in charge of sales engineering in the industrial department.



Tester for surface hardness determinations

Hardness Tester for Non-Conductive Organic Coatings

New Instrument Measures All Forms of Coated Metal

A NEW INSTRUMENT for determining the hardness of non-metallic coatings on metals has been developed. This hardness tester* was originally designed for the specific purpose of measuring the surface hardness of beverage crowns and lug and continuous thread jar closures by R. C. Albrecht, senior engineer in the research and development department of Crown Cork and Seal Company. It was designed for Crown because previous instruments have been for the purpose of testing flat surfaces only. The new device has demonstrated that it will test practically all forms of coated metals—flat as well as curved.

Components of the Tester

The instrument consists fundamentally of a means of automatically applying a load of uniformly increasing increments to a stylus moving slowly away from the fixed center of the test specimen toward the periphery while the specimen is being rotated at a fixed speed. The stylus is held by a dielectric holder and is connected to the control grid of a thyratron tube. When the coating is pierced by the stylus, the ground-

* Gardner-Albrecht Coating Hardness Tester

ing of the control grid of the thyratron tube operates a relay in the plate circuit and the drive motor is stopped. The load in grams required to affect the break-through is then read from the instrument scale.

The drive mechanism is located in the base of the instrument. A small gear reduction motor actuates the specimen turntable, the stylus position cam and the chain driven weight position components.

Varying the Operating Cycle

The motor is connected to the drive mechanism by means of change gears. By selection of appropriate gear ratios, the operating cycle can be varied from a maximum time of 33 sec to a normal of 20 sec or a minimum time of 12 sec.

A clutch assembly adds further versatility to the instrument by permitting it to be used with a uniformly increasing applied load or the load may be established at a desired value and maintained at this figure for the complete test.

The stylus beam-loading mechanism is located above the base or chassis and it will be observed that the entire assembly is carried by a column and arm which are free to rotate about the stud shaft in response to the dictates of control lever whose movement is governed by the operation of cam. It will be noted that the weight or roller rests in the track of a beam and at the start of a test is positioned at the left. As the test proceeds, the roller is slowly automatically moved outwardly on the beam until finally, if the full travel or loading were utilized, it would come to rest at the right. At this position the beams give a multiplying factor of 10X, thus a 200 g roller will give a maximum load of 2000 g to the stylus. By utilizing rollers of varying weights, the applied load can be tailored to suit the particular coating under test.

Spherical Stylus

Various types of styluses were tried and it was found that a sphere gave the most consistent readings; i.e., the spherical surface required greater loadings to affect a break-through of the film thereby rightly relegating the stylus itself to a secondary role. The spherical surface will not tend to "dig-in" to the microscopic hills and valleys of a surface as other shapes do. When the slope of a test surface is continually changing (as is the case of a crown) the axis of the stylus should theoretically change also in order to maintain both the stylus and the applied force normal to the surface.

By using a spiral or phonographic travel of the stylus over the test surface, a long travel, and hence small increments of load increase, can be obtained within a small area; which area is limited to that obtainable on the surface of a crown. For example, assume that a 200 g roller is in use and that the specimen turntable will make five complete revolutions. The stylus will traverse a path of 7.75 in., during which passage a total of 1600 g will be added to the stylus load (based on a stylus pre-load of 400 g and a final load of 2000 g). The actual increment increase in applied load is, therefore, only 20.6 g/0.1 in. travel of the stylus. The speed of travel of the test surface beneath the stylus is naturally progressively increasing as the spiral moves outwardly toward the periphery of the crown, but inasmuch as this change is a constant for all tests, it is automatically cancelled out in the evaluation of results. In order to prevent localized heating of the film under test, it is desirable that the speed of movement of the test surface beneath the stylus be kept low; the maximum rate of travel encountered is only 0.65 in./sec at the outermost point of the spiral passage when the specimen turntable is operating at its normal speed of 15 rpm.

Beverage crown in position on the turntable

The wiring diagram of the instrument is quite simple. The cam and carriage have been furnished with under- and over-travel limit switches which serve a dual function of contributing toward the automatic operation of the instrument as well as providing safety measures.

Simulated Test

While a beverage crown will be used for illustrating a test, other closures can be readily tested by substituting an appropriate turntable in place of the crown turntable. It will be further assumed that rotary switch of the elementary control circuit has been turned to contact No. 2 position and that a previous test has just been completed. The probe or stylus circuit of the thyratron tube has, therefore, been grounded (thereby reversing all relay contacts) and has maintained this ground through the sustaining circuit and rest button combination.

Self-latching lever is depressed and the stylus is thereby lifted a predetermined distance off the surface of the crown. By loosening the knurled set screw of turn-table, the crown previously tested can be removed and a new one placed on the table. The manually sustained lever is next depressed, thereby reversing the drive motor and bringing the stylus and roller back to their starting positions. The motor is automatically stopped by the undertravel limit switches. The manually sustained lever may next be released (automatically releasing self-latching lever) and thereby placing the stylus upon the surface of the crown and again reversing the position of the drive motor starting switch. The operator then momentarily depresses the reset button. The sustaining ground circuit of the thyratron tube is thereby broken, the tube relay reverses and the drive motor is energized. The crown turntable starts to rotate, the stylus slowly swings toward the periphery of the crown and the roller moves along the beam. When the break-through of the film is achieved, the control grid of the thyratron tube is grounded, the drive motor stops and the operator reads the weight required to achieve the break-through on the scale. Improper sequence operation of levers or the control grid reset button is prevented by means of the interlocking and masking features incorporated in the design.

Unequalled barrel finishing ...with 4 different TUMBLEX* abrasives

Here are vital steps that will give you exactly the results you're looking for on deburring, descaling and finishing your products.

One is to switch from out-of-date tumbling or off-hand methods.

The other is to check Norton Tumblex materials and learn which, together with modern barrel finishing techniques, make the best combination to meet your particular requirements.

The long, expert experience of Norton engineers in developing Tumblex abrasives has brought the value-adding, cost-cutting "Touch of Gold" to barrel finishing of the widest range of products. To you, this means prompt aid in solving finishing problems. Just send sample parts, ranging from tiny needles to hefty forgings, to the Norton Sample Processing Department. You'll get helpful recommendations as to the type and size of Tumblex material to use — plus other data on the tumbling barrel equipment and operating methods you need most. **Or write, to Norton Company, Worcester 6, Mass.** for a copy of the newly revised handbook on barrel finishing. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. Behr-Manning Company, Troy, N. Y., division of Norton Company. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

G-323

ALUNDUM* Tumblex "S". Newly developed bonded spheres that easily get into areas where other abrasive shapes can't reach. Exceptionally dense and long lasting, for top barrel finishing in many applications. In five different sizes.

ALUNDUM Tumblex "T". Bonded, triangular shape, and fast cutting for special shaped parts. Triangular form prevents wedging in work slots or holes. Available in four sizes.

ALUNDUM Tumblex "A". The workhorse for general barrel finishing. Performs several operations at once, removing flash, scale, tool marks and burrs, while forming radii and finishes to required microinch. Made in eleven sizes.

Tumblex "N". Natural stones, offered exclusively by Norton, for high lustre, especially on die castings and soft metal. Rounded uniform shape brings out the most desirable color of finished parts. In seven sizes.

NORTON
ABRASIVES

Making better products... to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels Grinding Machines • Refractories
BEHR-MANNING PRODUCTS: Coated Abrasives Sharpening Stones • Behr-cat Tapes

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

Available for Immediate Shipment, Attractive Values

The following excellent rebuilt and guaranteed electroplating motor generator sets and rectifiers, with full control equipment:

PLATERS

1—8000/4000 AMPERE, 6/12 VOLT, **CHANDEYSSON**, Synch.

1—7500/3750 AMPERE, 9/18 VOLT, **HANSON-VAN WINKLE-MUNNING**, Synchronous.

1—6000/3000 AMPERE, 6/12 VOLT, Electric Products, Synch.

1—5000/2500 AMPERE, 9/18 VOLT, **CHANDEYSSON**, Synchronous, Exciter-in-head.

1—4000/2000 AMPERE, 6/12 VOLT, **CHANDEYSSON**, Synch., Exc.-in-head.

4—3000/1500 AMPERE, 12/24 VOLT, **CHANDEYSSON**, Exciter-in-head.

1—2500/1250 AMPERE, 9/18 VOLT, **ELECTRIC PRODUCTS**, Synchronous, Exciter-in-head, 25°C.

1—2000/1000 AMPERE, 6/12 VOLT, **HANSON-VAN WINKLE-MUNNING**.

1—1500/750 AMPERE, 12/24 VOLT, **CHANDEYSSON**, Synchronous, Exciter-in-head.

ANODIZERS

1—1000 AMPERE, 40 VOLT, **CHANDEYSSON**, 25° C.

1—1000 AMPERE, 40 VOLT, **IDEAL**, Exciter-in-head.

1—750 AMPERE, 60 VOLT, **HANSON-VAN WINKLE-MUNNING**, Synchronous, Exciter-in-head.

1—500 AMPERE, 25 VOLT, **CHANDEYSSON**, Synchronous, Exciter-in-head.

4—400 AMPERE, 40 VOLT, Separately Excited.

RECTIFIERS

1—2000/1000 AMPERE, 6/12 VOLT, **G. E.**

1—**GREEN SELECTOPLATER**, 1000 AMPERE, 12 VOLT, 220/3/60.

1—SEL-REX SELENIUM, 1200 AMPS, 9V, for 440/3/60.

1—1500/750 AMPERE, 6/12 VOLT, UDYLITE-MALLORY.

4—1440/720 AMPERE, 6/12 VOLT, UDYLITE-MALLORY.

1—750 AMPERE, 12 VOLT, SELF-CONTAINED SELENIUM, UDYLITE-MALLORY.

SPECIAL

2—CROWN & HVW-M Centrifugal Driers No. 1 and No. 2 with Heat.

1—HVW-M Full Automatic Plating Machine, 82' long, 39" lift, was used for chrome.

1—UDYLITE Semi-automatic Plating Machine, for cyanide, size 19' long x 48" wide x 36" deep.

2—**RONCI** Enamelers, No. R-100 and No. R-200.

1—**ALMCO** DB8 Deburring Barrel, 2 Comp. Vari Drive.

1—ALMCO DB-2 Deburring Bbl. lined.

Above is partial list only. Write to us for all your requirements for Plating, Anodizing and Metal Finishing

WIRE—PHONE—WRITE

M. E. BAKER CO.

25 WHEELER STREET

Kirkland 7-5460 CAMBRIDGE 38, MASS.

EQUIPMENT & SUPPLIES

(Continued from page 278)

temperatures between 120 and 140 F. Coating develops rapidly, particularly in deep cavities, thus minimizing the usual rusting difficulties.

E—314. Method for Coloring Copper—Enthone, Inc. has announced the development of a new process called Enthocolor 220 for producing brown and shiny blue-black coatings on copper and copper base alloys. The coatings produced are oxides. Uniform brown colors can be produced on copper and on almost all copper alloys. Blue-black and brown colors are produced on brasses containing 20 per cent or more of zinc. Due to the fact that the finishes formed are oxides, no subsequent crystal spotting occurs. The adhesion of the finishes is reported to be excellent. Work can be severely deformed without causing the coating to flake. Attractive two-tone effects can be obtained by relieving portions of the oxide coating.

Enthocolor 220 is supplied as an alkaline salt mixture and is used at 180 to 225 F. Parts to be colored are given the usual preparatory treatments and are then immersed in the Enthocolor 220 solution for periods of 1 to 15 min. The brown shades are stated to be very attractive and can be used in place of brown lacquers or enamels as well as sulphide finishes.

E—315. Nonflammable Solvents—Nonflammable solvents that will bite into and remove oil, grease, and dirt without harming delicate metal parts or electrical insulation, yet are safe enough to use in ordinary work areas with conventional ventilating equipment, are now available to solve industrial cleaning problems.

Adaptable to vapor degreasing or cleaning by liquid immersion, the solvents will be marketed by the Du Pont Co. under its Freon trademark. Three types, all classified technically as "selective solvents," are available in containers ranging from 10 to 55 gal.

Because the solvents are nonflammable and nonexplosive, they can be used in open shop areas without danger of fire. From an inhalation toxicity standpoint, they are rated as the safest of the commonly used nonflammable solvents.

Three types of the Du Pont solvents now are available—Freon MF, with a boiling point of 75 F.; Freon BF, which boiling point of 75 F; Freon BF, which boils at 199 F, and Freon TF, whose company explained, makes the Freon solvents adaptable to use in many types of mechanical cleaning equipment. Small, portable, and inexpensive cleaning tanks, which would not be suitable from a safety standpoint for use with more toxic or flammable solvents, are now being developed for small-scale cleaning operations.

1956 TECHNICAL PROCEEDINGS AVAILABLE FOR ORDER

Demand, internationally, for copies of the recently published 1956 Edition of the AES's book, TECHNICAL PROCEEDINGS, is gaining momentum. Hence, the Society's limited remaining supply is diminishing.

Containing each of the 42 papers delivered before the AES's last Annual Convention, together with their charts, diagrams, graphs, tables and other illustrations, and with the verbatim discussion that followed their delivery, TECHNICAL PROCEEDINGS broadly enriches technical and scientific knowledge in the field of electroplating, metal finishing and allied arts. It totals 308 pages compared with the 1955 Edition's 255 pages.

Orders for copies will be accepted and serviced by the American Electroplaters' Society on strictly a first-come, first-served basis so long as its limited supply lasts.

The domestic cost of the book is $12.50 per copy including postage. To those ordering it from outside the United States' continental limits, the charge is $15 per copy including postage cost. All orders must be accompanied by payment in full to obviate unnecessary bookkeeping expense. Address orders to:

AMERICAN ELECTROPLATERS' SOCIETY, INC.

445 Broad Street, Newark 2, N. J.

Shoot your chrome questions at Diamond

Let DIAMOND's technical specialists ZERO in on your chrome-plating problems. These specialists are ready and able to handle your questions—quickly and completely. Their service is free.

In making chromic acid, DIAMOND controls quality from start to finish. DIAMOND experience begins with importing the chrome ore and making the soda ash. It includes *every step* through production and delivery, right up to standing by your side, if you wish, to help you get top-quality plating results consistently, economically.

DIAMOND facilities—two chromic acid plants and nine warehouses and sales offices across the country—assure you uninterrupted supply. DIAMOND ALKALI COMPANY, 300 Union Commerce Building, Cleveland 14, Ohio.

DIAMOND CHEMICALS

Diamond Chromic Acid

EQUIPMENT & SUPPLIES

E—316. Electronic Indicator—Cleveland Instrument Co., Inc. has announced a new, portable dimensional gage and comparator that places the ability to gage accurately to millionths of an inch within the reach of the small shop. The new design of amplifier and stand combines the accuracy of laboratory type instruments with the versatility required for shop inspection and gage room use.

The change from coarse to fine measurements is accomplished merely by turning the range switch and the zero points and readings coincide on all scales without separate adjusting for each scale. A wide range centering control permits shifting of the zero electrically to facilitate easy setup and provides additional flexibility in measurements. The new three pad base of the rack and pinion general purpose stand reduces the skill required for precise measurement since it is easier to wring out the air film between the base and surface plate.

E—317. Plating Precision-Fitted Bearings—Fretting corrosion, one of the most troublesome problems encountered with anti-friction bearings, reportedly is avoided by means of the Dalic process. Using these newly developed techniques and materials, it is possible to achieve a tight, uniform fit between the bearing rings and the housing (or the shaft), thus eliminating the so-called "three-point-fit." Even under severe vibration, the bearing will remain in place; it will not seize the shaft, or cause galling or other damage.

Four metals have been found suitable for this purpose—tin, cadmium, copper, and silver—but from all-around practical considerations, tin is most often used.

Dalic equipment and materials offer a simple means of area plating; one can plate only the section of a housing which is to receive the bearing, without having to immerse the entire unit in electrolyte. Basically, the Dalic unit consists of a special rectifier, with a finely graduated voltage control to permit deposits accurate to within 0.00005 in. Connected to the rectifier are two leads; the cathode is clamped to the work, the anode to the stylus with which the plating solution is applied. Several types of styluses are available: plug-type, cap-type, either air-cooled or water cooled. Their choice depends on the area to be plated but, unless the bearing housing is very large, one of the smaller available air-cooled styluses will generally be adequate.

E—318. Water Filtration Unit—The new Heico MIK filtration units have been developed to meet the needs of the electroplating industry.

The Heico MIK permanent cartridge makes possible the production of physically pure water that heretofore could be produced on a very limited supply. Capacities range from 3 to 10 gal/min and remove all physical impurities larger than the rated densities of the cartridges. Heico MIK Permanent Cartridges are available in the following densities: 25, 10, 1 and 0.1 μ.

E—319. Cadmium Plating Process—A new cadmium plating process that produces lustrous bright deposits with low brightener consumption is announced by Hanson-Van Winkle-Munning Co.

Increased brightness, brightener life and plating speeds are claimed for the improved Cadalume process. For many applications a subsequent bright dip operation is not necessary.

Most conventional cadmium solutions, or an existing bright cadmium bath, can be converted to the new Cadalume process by simply adjusting the solution to the formula given below, then adding the required amount of make-up brightener. A sample solution may be sent to the Hanson-Van Winkle-Munning Co. laboratory, for conversion recommendations.

For making up a new bath or converting an existing one:

Formula	Optimum	For 100 gal
Cadmium oxide	3.5 oz/gal	22 lb
Sodium cyanide	15.0 oz/gal	94 lb
Cadalume Make-Up Brightener	1.28 fl oz/gal	1 gal

Operating Conditions

Cadmium as metal	3.0–4.0 oz/gal
Temperature	85–95 F
Current density	10–60 asf
Voltage	3–4 volts

E—320. Metal Parts Cleaners—Circo Equipment Co. is in production on a new motor operated, fast-action small metal

ATLANTIC GREASELESS COMPOUNDS

Now PLASTIC TUBES

eliminates peeling of the container in application.
Revolutionary! — Try it!

Foil lined, fibreboard container

Plastic or Aluminum Tube

ATLANTIC GREASELESS COMPOUNDS offers a new plastic container, the most modern method of packaging for economy and ease of application. Standard aluminum package and foil lined fibreboard containers available if desired.

The rigidly controlled uniformity of ATLANTIC COMPOUNDS helps you maintain your high finishing standards. This dependable uniformity is assured by the highest grade ingredients and by extremely close quality control in manufacturing.
Devoted exclusively to producing unexcelled greaseless compounds, Atlantic maintains constant research striving for continually improved products. Technical assistance and data available upon request.

Aluminum Tube

Certain franchise territories available — your inquiries are invited.

THE ATLANTIC COMPOUND CO.
1860 BALDWIN STREET WATERBURY, CONNECTICUT

99.75% Chromic Acid

purity

CrO_3 . . . . . 99.75% MIN. SO_4 . . . . . 0.1% MAX.

When a commercial chemical runs 99.75% pure, the user need not ordinarily concern himself about the remaining 0.25%. In chromium plating, however, the 0.25% is important because it includes whatever sulfate is present.

While the maximum amount of sulfate permitted in Mutual Chromic Acid is only 0.1%, average production is well below that figure. Furthermore, the sulfate content varies but little from drum to drum. No other impurity exceeds 0.01%. The balance represents a trace of moisture which, of course, is harmless. This close attention to small details is one reason for the wide acceptance of the Mutual label wherever quality chromium plating is performed.

Sodium Bichromate • Chromic Acid • Potassium Bichromate

MUTUAL CHEMICAL DIVISION

MUTUAL — ALLIED CHEMICAL & DYE CORPORATION

99 PARK AVENUE • NEW YORK 16, N. Y.

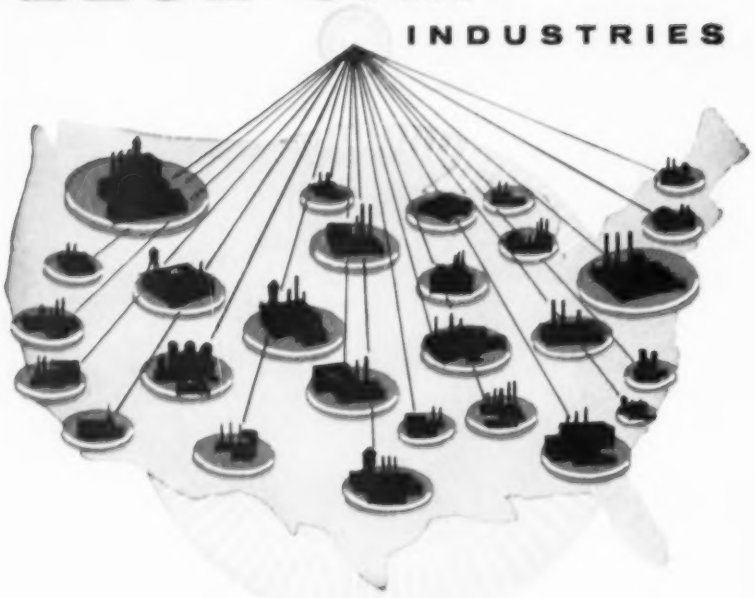
Allied Chemical

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 332.

Choice of the Nations

BLUE CHIP

INDUSTRIES



MEAKER

ENGINEERED
PLATING
EQUIPMENT

Meaker equipment is used for efficient and economical plating by many of the nation's most important builders of such products as automobiles, appliances, machinery, furniture and many others. When they install Meaker engineered equipment they are assured that it is designed to meet specific requirements. They are also certain that Meaker will stand behind the equipment during its whole operational life, making sure that it produces the best possible plating job at reasonable unit costs.

Meaker has accomplished much for other manufacturers. Why not find out what we can accomplish for you? Our engineers will be happy to survey your problems with you and recommend the equipment you need. Call or write today!

THE MEAKER COMPANY

1633 SOUTH 55th AVE. • CHICAGO 50, ILLINOIS • Phone OLympic 2-2110

● Full Automatic and Semi-Automatic Plating Machines ● Strip Steel Plating Equipment ● Wire Galvanizing Equipment ● Batch Type Plating Machines ● Pickling Machines ● Motor Generators for Plating ● Processing Conveyors ● Rectifiers for Plating

EQUIPMENT & SUPPLIES

parts power agitation cleaner. The new machine, Model MPC-5, is reported to be rugged and efficient for cleaning small metal parts and accessories.

Developed as a low-operating-cost, budget machine, the MPC-5 is economical to operate because of its effective use of cleaning agents, and because it does not entail the use of skilled labor. This machine is available for cold operation or with steam and electric heat.

Circo also has announced the development of models MPC-3 and 4, which are designed for universal applications in the parts cleaning field, are adaptable for use with all solvents, alkalis and acidic solutions. The powerful air-cylinder agitating action cleans fast and effectively. The machines incorporate combination settings for washings, pre-washing, rinsing and drying, and there is a convenient three-way control valve for automatic raising and lowering of the work platform to waist level for easy loading and unloading.

E—321. Push Button pH Meter—Beckman Instruments, Inc. announces the new Zeromatic (T.M.) pH meter—an automatic push button instrument with drift-free amplifier which can be adapted for potentiometer recorder output, automatic temperature compensation, and Karl Fischer titrations.

This line-operated instrument features automatic correction for electronic zero drift and push button control. It has a 0 to 14 pH scale range and two mv ranges: 700-0-700 mv range and the extended 0 to 1400 mv range. The extended range is particularly useful for oxidation-reduction titrations.

The new instrument is designed for automatic accuracy. Operator reading error is minimized with the mirror-backed scale (pH and mv) which eliminates parallax. pH readings are accurate to 0.1 pH unit and reproducible to 0.02 pH.

The Zeromatic is left connected to the 115-v power source at all times—on 'standby.' To make a pH reading, the 'read' button is depressed. Push buttons also control temperature compensation and selection of the appropriate mv range.

E—322. Graphitic Brushes—The Ohio Carbon Co. states that performance of their new D series of brush grades under adverse conditions, has now been fully proved. Unnoticed, tough physical and atmospheric conditions might gradually reduce commutator efficiency. The D series will prolong it, they state, using as an illustration, the continuous operation of a crane in fumes over plating or pickling baths.

The series grades are characteristically electrographitic lamp black brushes of the quality manufactured primarily for modern d-c motors and generators. This series has high contact drop, low friction, and good carrying capacity.

Cleaning Specialists*

*[SPE'CIAL·IST—One who devotes himself to some special branch of activity.]

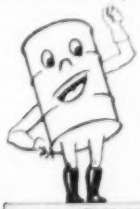
At Northwest our "special branch of activity" is solving your cleaning problems.

Behind your friendly, competent Northwest Sales Engineer stands a reputation for providing industry with low-cost, analytically-correct, job-adjusted chemical cleaners.

From Northwest's years of experience in formulating the RIGHT cleaner for your specific needs have come such developments as the LO-HI pH PROCESS—for cleaning prior to plating, painting, or vitreous enameling; ALKALUME PROCESS—for preparing aluminum and magnesium for finishing and spot welding; INTERLOX PROCESS—for phosphate coating; SPRA-LUBE—to control over-spray of "today's" paints in water wash paint booths; PAINT STRIPPERS—specific to your needs; SUPER-DRAW & FLUID FILM—for drawing metals.

Remember—YOUR COST PER FINISHED ARTICLE IS THE TRUE COST OF YOUR CLEANER.

Northwest's production-tested chemicals and "Right the first time" recommendations will save you money. Northwest Service is as close as your phone.

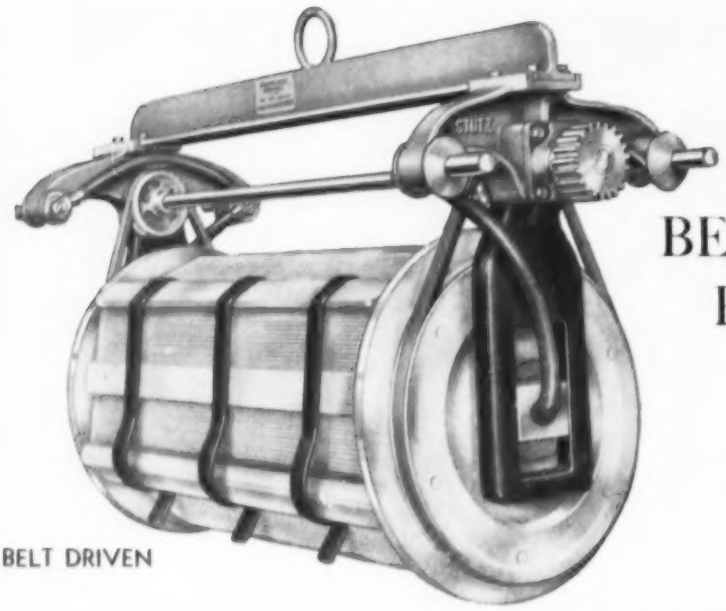


LO HI pH

NORTHWEST CHEMICAL CO.

9310 ROSELAWN DETROIT 4, MICH.

pioneers in pH cleaning control ... serving you since '32



BELT DRIVEN

unmistakably the finest

BELT DRIVEN PLATING BARREL

★ Lower Initial Cost

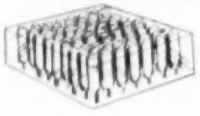
★ LOWEST Possible Maintenance

★ No Cylinder Gears

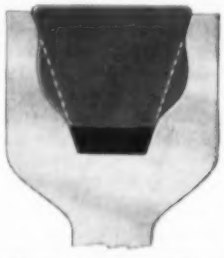
★ No Cylinder Bearings

Greater Current Carrying Capacity Which Lowers Plating Time and Cost . . .

Stutz Belt Drive complete cycle Plating Barrel. This unit incorporates a cylinder of one piece Plexiglas construction, suspended and rotated by two V belts and arranged between cast steel guide frames protected with 5/16" thick special vulcanized hard rubber. For smooth barrel operation, saddle horns are located on 15" centers, 4 provided for maximum current. Cylinder door is heavily reinforced and is locked with vinyl chloride covered spring steel bung clamps. Cathode contactors are dangler type. These units made to fit most makes of plating tanks and furnished also with motor drives mounted directly on cylinder superstructure. Standard sizes 14"x30" and 14"x36" (I.D.). 13 additional sizes from 12"x24" to 18"x42" (I.D.). Standard perforations 3/32" round on 3/16" centers. Dual hole for processing of extremely small parts available.



Specially designed counter pulleys of monel metal with deep dimples for positive grip against belt face.



This shows the belt expanding into the dimples of the driving pulleys. This action provides positive pull with no abrasion to the belt whatsoever.

Patent Pending

Write for Catalog & Prices

STUTZ PORTABLE PLATING BARRELS

The Stutz Portable Barrel is made in 2 standard sizes with cylinders having inside dimensions of 6" x 12" and 8" x 18", I.D., and smaller upon application. Standard openings are 3/32". Smaller or larger opening can be furnished as required.

Baskets in perforated metals or wire mesh.

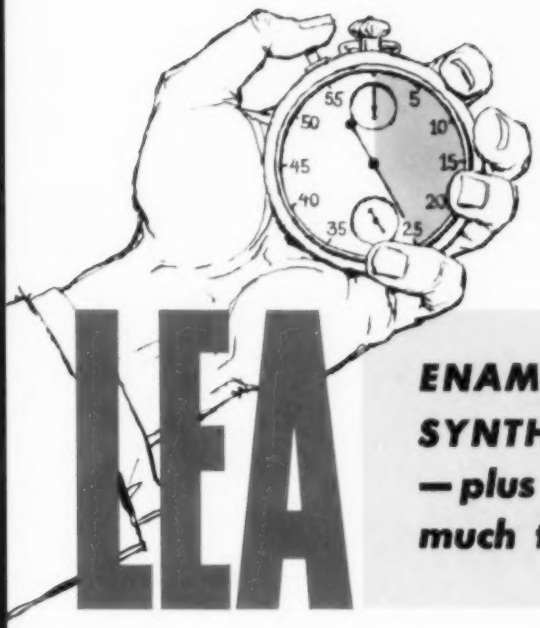
Load-Unload Stand for convenient and fast handling of work load.

GEORGE A. STUTZ MFG. CO.

4420 CARROLL AVENUE • CHICAGO 24, ILL.

"Complete Metal Finishing Equipment & Supplies"

Serving Industry 35 Years



LEA

ENAMEL, LACQUER and SYNTHETIC COATING STRIPPERS —plus Lea Compounds— have contributed much to the organic finishing field

You know about the many Lea Compositions, both solid and liquid, that are doing such an excellent job of Burring, Buffing & Satin Finishing metal, plastic and wood surfaces.

Lea Products also serve the organic finishing field with equal efficiency and economy. For example:

- **First there is the use of one or more grades of Lea Compound to properly prepare metal surfaces for paint, lacquer or enamel adhesion.**
- **LEA SYNSTRIP** . . . **a fast working, non-corroding liquid enamel, lacquer and synthetic coating stripper; baked coatings slip off in sheets or shreds; will not attack aluminum, zinc or any other base metal or alloy; does not dissolve the coating but breaks the bond. When heated to temperatures of 160° to 200° F., stripping synthetic coatings of the alkyd, epoxy, phenolic, silicone and urea type, is accomplished in a matter of seconds.**
- **LEA COLDSTRIP** . . . **non-toxic stripper used at room temperature; only minimum ventilation; can be filtered for continued recirculation.**

While Synstrip and Coldstrip do similar work, the choice depends upon volume of work, operating conditions, ventilation facilities, etc. We suggest that you outline your set-up and let our technical staff recommend which of the two would be better for your stripping requirements.

Burring, Buffing, Polishing, Lapping, Plating and Spray Finishing . . . Manufacturers and Specialists in the Development of Production Methods, Equipment and Compositions. Manufacturers of Lea Compound and Learok . . . Industry's quality buffing and polishing compounds for over 30 years.

The Hallmark of Quality Products

THE LEA MANUFACTURING CO.
16 CHERRY AVE., WATERBURY 20, CONN.

Lea-Michigan, Inc., 14066 Stansbury Ave., Detroit 27, Mich.
Lea Mfg. Company of Canada, Ltd., 1236 Birchmount Road Scarborough, Ontario, Canada
Lea Mfg. Company of England, Ltd., Buxton, England
Lea Ronal, Inc., Main Office and Laboratory: 139-20 109th Ave., Jamaica 35, N. Y.
Manufacturing Plant: 237 East Aurora St., Waterbury 20, Conn.

Are you interested in Plating Specialties? SEE THE OTHER SIDE OF THIS INSERT.

...holds the BLUE RIBBON against all comers

. . . one reason is that in addition to its original excellence it is ably supported by Addition Agents of Blue Ribbon Quality

Consistently turning our copper plate which has become the quality standard of the industry at a surprisingly low cost, Lea-Ronal High Speed Bright Copper, with Lea Copper Glo as the key additives, should be investigated by every plant operating with cyanide copper. It offers so much in values that it should be tried. The vast majority of those who try it, adopt it.

Complementing this fine copper plating formula are several excellent addition agents; all helping to give top-notch performance:

ULTRATARTRAL

no burning; permits much higher current densities than with conventional coppers; higher free cyanide; sodium cyanide can be used at higher current densities; better anode corrosion; greater carbonate tolerance.

SUPERTARTRAL

primarily for barrel plating, far superior to Rochelle Salts or other tartrates.

WETTING AGENT CW-7

highly soluble additive which prevents deposition of metals on anode during idle time thus preventing Monday morning blues; increases bath tolerance to organics.

WETTING AGENT CW-6

low-foaming additive increases bath tolerance to organics in barrel plating.

T. S. T. PURIFIER

the best additive you can find for purifying baths containing chrome and other metal contaminants; particularly useful where zinc-chromium combinations exist.

CUPRALL

a well-proved process for providing all the values of Lea-Ronal Bright Copper with the exception of extreme brightness.

If you are interested in superior copper plate and high economy, you should make a thorough test of the Lea-Ronal High Speed Bright Copper Process. Set aside one tank and order enough for that tank. Give us your production schedule and we'll be glad to recommend the necessary quantity to make this comparative test.

The
LEA GROUP
serving the Finishing Field
Lea-Ronal, Inc., Jamaica, N. Y.
Lea-Michigan, Inc., Detroit
The Lea Mfg. Co., Waterbury, Conn.
Lea Mfg. Co., of Canada, Ltd.
Lea Mfg. Co., of England, Ltd.
Plating Polishing Buffing Burring

Lea-Ronal Inc.

Sales and Manufacturing Plant: 237 East Aurora Street, Waterbury 20, Conn.
Main office and Laboratory: 139-20 109th Avenue, Jamaica 35, N. Y.

Are you interested in Buffing, Polishing and Burring Specialties? **SEE OTHER SIDE OF THIS INSERT.**

Complete Information on this Cost-Saving Finishing Method!

HANDBOOK OF
BARREL FINISHING

By RALPH F. ENYEDY, Industrial Engineer, Electronic Tube Div., Westinghouse Electric Corp.

For the first time in book form, here are the complete details of this precise, economical method of finishing metal and plastic parts. Every phase of barrel finishing from cleaning and deslugging to coloring, polishing, and burnishing is covered step by step. More than 150 complete specification sheets give *all* the information needed for finishing a tremendous variety of parts. And the latest developments in equipment, finishing compounds, and methods are described in full detail.

Much of the information on such operations as preparation of metals for sealing to glass, deburring of screw machine parts, and multi-barrel processing has never before appeared in print. A contribution of great interest and value to anyone concerned with small parts finishing. 288 pages

Non members, $8.25 Members $7.00

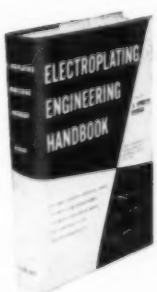
New Edition
Completely Revised and Enlarged

PROTECTIVE COATINGS FOR METALS

By R. M. BURNS, Former Director of Chemical and Metallurgical Research, and W. W. BRADLEY, both of Bell Telephone Laboratories

Contains the latest information on the composition, properties, and performance of metallic and organic coatings. New chapters are devoted to inhibitors, chemical conversion coatings, and sprayed coatings. Troublesome phenomena known as "silver migration" and "metallic whiskers" are fully discussed and latest practices in metal cleaning, coating application, and coating testing are explained.

Non members, $12.00 640 pages Members, $10.20



THE Complete Handbook of the Field!

ELECTROPLATING ENGINEERING HANDBOOK

Edited by A. KENNETH GRAHAM, in connection with 40 widely known experts in the plating field

This comprehensive book provides nearly 800 pages, jam-packed with tables, charts, plans, and illustration . Brings you all the most recent information available on processing techniques, and the engineering factors involved in constructing and installing plating equipment.

784 pages Profusely illustrated

Non members, $10.00 AES members $8.50

Send check or money order with all orders

AMERICAN ELECTROPLATERS' SOCIETY
445 Broad Street • Newark 2, N. J.

First Class Permit No. 4032, Sec. 34.9, P. L. & R. Newark, N. J.

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

Postage Will be Paid by Addressee

AMERICAN ELECTROPLATERS' SOCIETY
445 BROAD STREET
NEWARK 2, NEW JERSEY

Att. Book Dept.

READER SERVICE CARD

March 1957. Do not use after May 15, 1957

Please send me information on the following—

Ads:	A.....	A.....	A.....	A.....	A.....	A.....	A.....
	A.....	A.....	A.....	A.....	A.....	A.....	A.....
Tr. Lit.:	L.....	L.....	L.....	L.....	L.....	L.....	L.....
E & S	E.....	E.....	E.....	E.....	E.....	E.....	E.....

Name.....Position or Title.....

Company.....

Company Address.....

City.....Zone.....State.....

PRICES FOR ELECTROPLATING SUPPLIES

Anodes

COPPER	
Cast elliptical, 18 inches or longer, 5000 lb lots	53.42
Electrodeposited	43.28
BRASS, 80-20, ball anodes, 2000 lb or more	54.00
ZINC, ball anodes, 2000 lb lots	21.25
(for elliptical add 2¢ per lb)	
NICKEL, 99 pct plus, rolled carbon	$1.0225
(rolled depolarized add 3¢ per lb)	
CADMIUM	$1.70
TIN, ball anodes and elliptical per inch	$1.07

(Cents per lb, freight allowed in quantity)

Primary Metals

GOLD, U. S. Treas., per oz	$35.00
INDIUM, 99.9 per cent, per oz	$2.25
LEAD, New York, cents per lb	16.00
PALLADIUM, per troy oz	$23 to $24
PLATINUM, per troy oz	$98 to $101
RHODIUM, per oz	$120 to $125
SILVER, New York, cents per troy oz	91.375

Chemicals

BORIC ACID, bbl.	9.00
CADMIUM OXIDE, 100 lb drum	$1.70
CAUSTIC SODA, 100 lb drum	7.50
CHROMIC ACID, flake type, 1 to 20 100 lb drums	31.75
COPPER CYANIDE, 100 lb drum	77.50
COPPER SULFATE, 5 or more 100 lb bags, per cwt	26.65
NICKEL CHLORIDE, freight allowed, 300 lb.	45.50
NICKEL SULFATE, 100 lb.	40.50
POTASSIUM CYANIDE, 100 lb drum N. Y.	48.00
POTASSIUM STANNATE, 100 to 300 lb drums	85.70
ROCHELLE SALTS, 250 lb	47.00
SODA ASH, 100 lb.	4.77
SODIUM CYANIDE, domestic, f o b N. Y., 200 lb drums	23.05
SODIUM STANNATE, 100 to 600 lbs	70.70
ZINC CYANIDE, 100 to 900 lb	55.55
ZINC OXIDE, American process, lead free, 100 to 500 lbs.	16.5

(Cents per lb, f o b at point shipped)

Prices in effect February 12, 1957

These prices, while derived from authentic sources, may be expected to vary by geographic location, quantity purchase, FOB and other terms, market influences and variations. They are presented solely as a general guide.

Book Order Card

Please send me the following

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

☐ AES Member

☐ Non-Member

This card is for ordering Books, ASTM-AES Specifications and Standards (No Charge) and PLATING Binders, $3.00

Enclosed is check money order for $. . . . . (Payable to American Electroplaters' Society)

Name . . . . . .

Company Name . . . . . Title . . . . . .

Address . . . . . .

City . . . . . Zone . . . . . State . . . . . .

If Non-Member ☐ Please send me literature about the American Electroplaters' Society

First Class Permit No 4032, Sec. 34.9, P. L. & R. Newark, N. J.

Postage Will be Paid by Addressee

BUSINESS REPLY CARD

No Postage Stamp Necessary if Mailed in the United States

PLATING

445 BROAD STREET

NEWARK 2, NEW JERSEY

Attn.: Reader Service Department

LOW COST

THINKER BOY Plating Racks
Reduce racking costs — tremendously!

NO WAITING

No Make shift Racks —

You don't have to use inefficient racks to get work out on time. With THINKER BOY you can assemble racks designed for the job and be in production over night.

Just drill holes to install tips or join frame members—insert studs —draw nuts tight—install sealing caps.

REDUCED COSTS

With THINKER BOY, rack designing is easy and fast — No sketching — No drawing — Just lay out the THINKER BOY Members and Tips with the work you have to plate. You can make a sample rack in minutes. Develop highest racking efficiency for lowest racking costs.

NOW ONLY $2.78

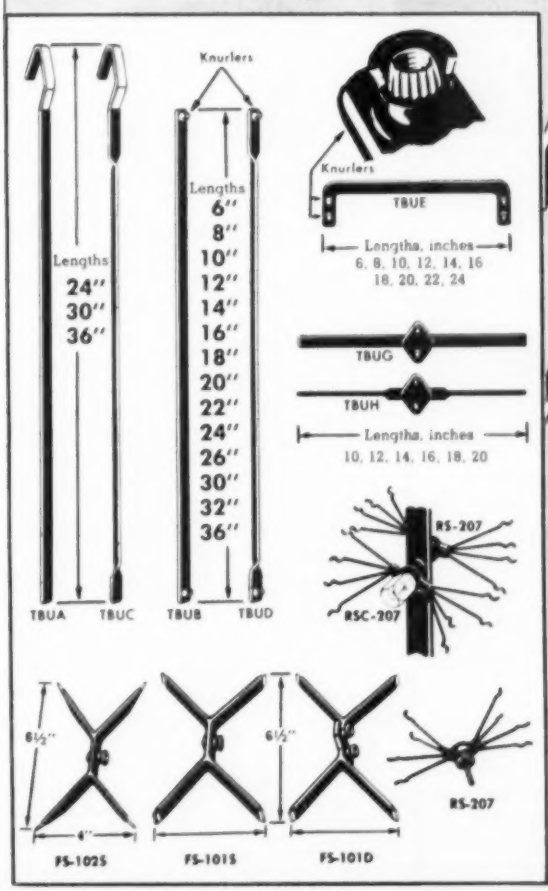
Insulated Thinker Boy TBUA Spines

24" — $2.78
30" — 2.95
36" — 3.12

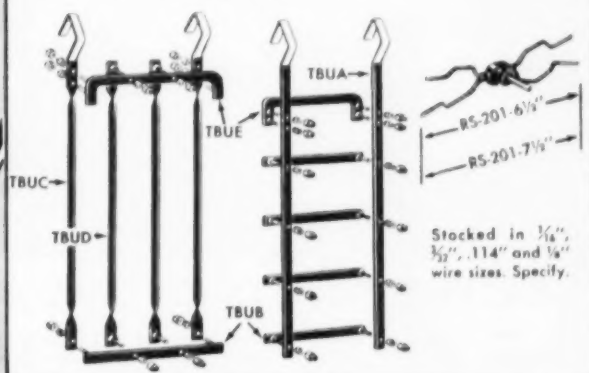
FLEXIBILITY UNLIMITED

With THINKER BOY a broken or damaged tip doesn't ruin or tie-up the rack. You can replace THINKER BOY Tips *right on the job in a jiffy.*

When a job is all through, *finished,* THINKER BOY Racks do not become worthless like other racks. You can change the tips or tip spacing for efficiently plating other work, or disassemble and use the parts in other racks.



With THINKER BOY Rack Members you can assemble single, double, triple or quadruple spine racks, cross bar, and T racks in a wide range of sizes to the spacing you want.



Stocked in 1/16", 3/32", .114" and 1/8" wire sizes. Specify.

Send for the THINKER BOY Instruction Manual. See how simple it is to assemble completely insulated racks of your own design. Check the great variety of THINKER BOY Tips. The more you think about THINKER BOY the more you will save.

Belke MANUFACTURING CO.
947 N. Cicero Ave.
Chicago 51, Ill.

EVERYTHING FOR PLATING PLANTS

L—323. Electroplating on Aluminum—A process for electroplating on aluminum is described in Technical Data Sheet No. 13, a four-page usage and instruction sheet prepared by Mac Dermid Incorporated. Named the Alumetex Process, the new method works equally well on most commercial alloys and may be varied to handle special alloys. Because of the dense, fine-grained zincate deposit, unusually blister-free, corrosion resistant deposits can be obtained. Since electroplate coverage is complete, aluminum alloys may be soft soldered or even tumbled after treatment without loss of adhesion qualities.

L—324. Dripproof Motors—Bulletin GEA-5980, a 12-page publication of General Electric Co. illustrates production testing techniques and construction features of Tri*fe*lad 55 motors, 1 to 5 hp dripproof and enclosed. The color bulletin also describes servicing and installation advantages of the complete line.

L—325. Industrial Gloves—The Industrial Division of The Wilson Rubber Co., Ohio, manufacturer of rubber gloves, has a completely new 16-page catalog of Wil-Gard industrial gloves and finger cots.

Wilson's complete line of curved-finger rubber, latex, neoprene, Buna-N, and Compar plastic gloves is fully described and illustrated in color. The new catalog includes a chart of finger cot sizes in actual diameters, and features a two-page recommended use table showing the resistance ratings of various Wil-Gard glove materials to 199 chemicals and solvents commonly used in industry.

L—326. Lapping Compound—A new booklet has been issued by Timesaver Products Co. outlining moneysaving methods of fitting bearings, gears, slides, pistons, etc. with lapping compound. Timesaver lapping compound reportedly will not charge or imbed into metal surfaces or continue to cut. It has been used by manufacturers, and the Army and Navy for 30 years.

L—327. Casting Alloys Wall Chart—A comprehensive wall chart, 17 x 22 in. describing brass, bronze and nickel silver casting alloys, has been issued by Henning Bros. & Smith, smelters and refiners, of Brooklyn, N. Y.

The wall chart details information regarding 37 standard alloys, their Navy, SAE, ASTM and Federal specification designations, and the chemical composition by percentages of ingredient metals.

L—328. Wire Products—A new 120-page Manufacturers Wire Handbook featuring almost 100 types of steel wire is available.

The handbook, presented in an editorial format for greater readability, contains complete information on wire products made by Pittsburgh Steel Co. and its subsidiary Johnson Steel & Wire Co. of Worcester, Mass.

Sections in the handbook are devoted to cover spring wire, ACSR core wire, strand wire, rope wire, high carbon specialties, shaped wire, wire for cold heading and cold forging, welding quality wire, wire for industry, mill practices.

Each of the types of wire is individually described as to size range, weights, tensile strength and chemical composition is provided. Sixteen pages are devoted to tables and a hardness conversion chart. A handy glossary describes technical and semi-technical terms used in the handbook.

L—329. Submicron Filter—A new Barnstead bulletin, No. 141 describes how the Barnstead MF submicron filter works and reveals how through this new filtering process ultra-high purity water is possible in production quantities which formerly was attained only in batch quantities in the laboratory.

The bulletin further points up how this method of filtering either distilled or demineralized water opens up new process techniques in electronic and nucleonic fields. The filter element, because of its construction, is well suited for the analysis of impurities retained on the filter when so desired.

L—330. Polishing and Grinding Wheels—A new illustrated booklet describing "PG" (polishing and grinding) wheel applications in case history form has been published by Minnesota Mining and Manufacturing Co.

The 12-page publication, called "Mod-

THE NEW VERSATILE
NON-DESTRUCTIVE
COATING-THICKNESS
TESTER

DERMITRON

Unit Process Assemblies, Inc., pioneers in non-destructive testing and specialists in electronics for metal finishing, offer their latest DERMITRON D-2 with these features:

- Measures plated coatings on steel, brass, copper, zinc die-cast, aluminum, nickel-silver, bronze and other metals; also nickel on steel.
- Measures anodize and hard-coat on aluminum and magnesium; also paint, porcelain, organic coatings on non-ferrous metals.
- Measures metal coatings on plastics, ceramics and other non-metallic materials.
- Sorts or matches metals and alloys.
- Available with FOUR measuring probes for extra-wide thickness ranges from thin to thick deposits.
- Special probes can be provided for measuring on internal diameters, small diameters and otherwise inaccessible areas.
- Only ⅛" circle area required for measurement.
- You get fast, accurate, direct readings plus versatility and portability.

Write for latest brochure and questionnaire to help solve your thickness testing problems.

UPA

UNIT PROCESS ASSEMBLIES, INC.

61 East Fourth Street • New York 3, N. Y.

cyanide waste problems

with **HTH** *— the "dry" chlorine*

Chlorine's ability to convert poisonous cyanide to relatively harmless cyanate . . . plus the convenience of a *dry*, 70% available chlorine product . . . explains the ever-widening use of HTH to treat cyanide waste in the metal processing industry.

No costly equipment is needed. No special skills. HTH is safe and convenient to handle—and can be added right to cyanide waste solutions.

Safety . . . plus savings, too. HTH is stable—stores indefinitely, yet goes to work the minute you use it. There's no mixing, no carboys, no breakage, no waste. And in this dry, concentrated form, chlorine is as safe and easy to use as it is effective.

Find out why HTH is unmatched as a source of chlorine. For more information on the use of HTH for effective, economical treatment of cyanide waste, write today.

AVAILABLE IN TWO FORMS

HTH GRANULAR

For fast action, there's HTH Granular: non-dusty, free-flowing and fast-dissolving. Packed in 100-lb. drums and in cases of nine 5-lb. cans.

HTH TABLETS

For a slow, steady source of chlorine over a longer period, there's HTH Tablets. Packed in 100-lb. drums and in cases of twelve 3¼-lb. cans.

OLIN MATHIESON CHEMICAL CORPORATION
INDUSTRIAL CHEMICALS DIVISION • BALTIMORE 3, MD.

4882

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 338.

ern Metal Finishing with 3M PG Wheels," covers actual wheel applications in metal working industries.

Large size "PG" wheels (2 to 8 in. in width, 12 to 21 in. in diameter) are designed for use on floor lathes, semi-automatics and fully automatic polishing machines, rotary or straight line. Portable wheels (1 to 3 in. in width, 6 to 11 in. in diameter) are used on floor and bench lathes, portable and flexible shaft grinders.

L—331. Blast Cleaning Abrasives—Pangborn Corp. manufacturers of blast cleaning and dust control equipment has just issued a new 12-page illustrated manual on the full spectrum of blast cleaning abrasives—their characteristics, application and selection. The work details methods for improving cleaning quality and cutting production costs in foundry, descaling, mold and die, shop maintenance, decorating and carving, part reclamation and finishing operations.

L—332. Plating and Processing Equipment—Bulletin 856, entitled Plating and Processing Equipment is a new 8-page folder just published by The Meaker Co. It illustrates three automatic machines: The Meaker low-head side-arm automatic plating machine, "Little Giant Utility" plating and processing machine, and Automatic barrel plating machine.

Each model is fully described showing typical floor plans, cross section drawings highlighting important features and actual photographs of units with tanks removed to show complete structure of machines. Pertinent features such as drives, construction, indexing, lubrication systems, draining and optional features are covered.

The guide describes the importance of selecting the proper type and size of abrasive, covers abrasive properties and outlines the importance of selecting the correct abrasive for new blast cleaning equipment. Specifications of soft abrasives such as sawdust, walnut shells, pecan shells and rice hulls are reviewed.

L—333. Corrosion Resistant Equipment—A new 32-page catalog covering the corrosion-resistant plastic equipment of Haveg Industries, Inc. is available. The catalog, which marks the company's twenty-fifth anniversary, gives complete coverage to Haveg's synthetic resin formulations. In addition, it describes Haveg's newer products and materials—glass reinforced polyester, PVC (polyvinyl chloride), and Teflon equipment.

L—334. Coating Specifications—G. L. Industrial Coatings, Inc., announce the first of Painting, Under-Coating and Surface Preparation Specifications developed specifically for each industry and its subdivisions. These specifications are released after G. L. paint engineers and technicians have made an individual and exhaustive study of the industry and all factors surrounding its operating conditions. The element of corrosion protection, paint durability, surface preparation, compatible coatings and color scheming are given full and complete treatment.

The first of these specifications releases cover the steel industry and concentrate on blast furnace and rolling mill painting. Studies are being made of other divisions and will soon cover the entire metal working field.

L—335. Barrel Finishing Equipment—A 20-page general catalog of Globe barrel finishing equipment and supplies includes information on types of abrasive and burnishing media and compounds. It gives important facts about the six variables in barrel finishing and includes before and after photographs of parts which have had deburring, polishing, burnishing, radii forming, rubber deflashing and descaling.

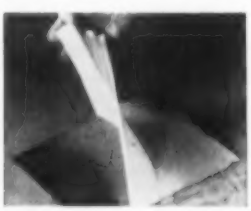
L—336. Corrosive Resistant Industrial Apparel—On-the-job tests have recorded another triumph for modern technology in special apparel for workers in corrosive areas. Made of DuPont Orlon and Union Carbide Dynel, this clothing assures such resistance to acids and caustics that it claimed to to outlast ordinary work clothes by as much as 50 to 1.

Recently developed by Worklon, Inc., manufacturers of industrial, commercial and laboratory apparel these fabrics are featured in the company's newest catalog, along with Lint-Free apparel, blends of 65 per cent Dacron and 35 per cent Rayon, acid-resistant underwear.

KLEM
PRODUCT OF THE MONTH

KLEM-FILM

A new vinyl plastic protective coating that can be sprayed or brushed on paint spray booths. This new product, "Klem-Film," can



be peeled off, removing paint deposit with it and leaving the booth clean. It offers several other advantages. (1) It dries extremely fast. (2) It is white in color, providing reflective light in the booth. (3) It will not support combustion when dry. (4) It has unusual tensile strength, peeling off in large sheets and speeding the job. (5) It does not lose its elasticity even when subjected for a long period to heat as high as 290°F. "Klem-Film" can be applied to other equipment than spray booths to protect them in use and in storage.

YOUR SURFACE FINISHING PROBLEMS . . . can be solved by Klem engineers. Our complete lab is equipped to duplicate almost any industrial situation, determine the cause of difficulty and suggest the formula and procedure for your operation.

THE KLEM REPRESENTATIVE

He's in your area to help you. The next time he calls at your plant, take advantage of his specialized experience and training in metal surface cleaning and preparation. If you have a problem he may be of help to you on the spot, if not he'll use the KLEM-PLAN to present the facts to our lab technicians.

KLEM CHEMICALS, INC.

WRITE FOR THE KLEM CATALOG, TODAY

14401 Lonson Avenue
Dearborn, Michigan

1950 No. Central Ave.
Elmonte, California

Sourdough?

...OR Real Dough!

WHEN YOU SHIP US

NICKEL PEELING SCRAP

FROM YOUR PLATING OPERATION

WE'RE ALWAYS BUYING ALL TYPES OF NICKEL PLATER'S SCRAP . . . AT TOP PRICES

FOR PROMPT QUOTATION SEND US A 5-LB. REPRESENTATIVE SAMPLE OF YOUR ACCUMULATION

INVOICE US FOR SAMPLE . . . OR WE WILL PAY ON BASIS OF LABORATORY ANALYSIS

FOR A "SURE" THING . . . *Phone . Wire . Write*

Stainless Steel Corp. of America

OHIO EDISON BLDG. YOUNGSTOWN 3, OHIO

Riverside 4-4123

Terminals for Conventioneers traveling to Montreal by train and plane. (Top, left) Trans Canada Airlines Downtown Terminal. (Top, right) Windsor Station. (Bottom, left) Central Station. (Bottom, right) Montreal Airport.

Canadian Plants to Welcome AES Convention Visitors

Interim reports are flowing from Montreal concerning impressive plans being made by the Ladies Committee of this June's Montreal Convention for the enjoyment of AES ladies attending that 44th Annual AES assembly. Above, the Committee in action. Left to right Mrs. J. P. Courtemanche; Mrs. Julien LaViolette; Mrs. John S. Serbeniuk; Mrs. G. Ross Davidson (Chairman); Mrs. Ben Mendels; Mrs. S. A. Frost and Mrs. J. T. Reisenburg Sr.

Four of Canada's industrial titans will welcome inspection by AES members as a "plant visitation" phase of next June's well-planned 44th annual convention in industrial Montreal, "Paris of the New World." The quartet includes Canadian Pratt and Whitney Aircraft Co., Ltd.; Canadian General Electric; Canadair, Ltd. and, importantly, the Northern Electric Company Co., Ltd. The first-named brace of companies will be visited on Monday, June 17, the latter on Tuesday, June 18.

Canadian Pratt and Whitney, mammoth fabricator of aircraft engines and spare

parts, will display a number of cleaning techniques and plating installations rarely seen in modern industry.

General Electric will show production of major electrical appliances from the sheet metal stage through transformation to superb final consumer products.

Proud builder of F-86 Saber Jets and CL-28's (big brothers of the Bristol Britannica), Canadair, among other wonders of its huge plant, will exhibit its 40-foot tanks containing 9000 gallons of cleaning solutions, iridite, rinses and anodizing solutions. And, by the way, the company has the largest tool bay in Canada. This is no promise yet but, weather permitting, AES visitors may even view a flight demonstration.

Collateral to its manufacturing processes, Northern Electric operates one of the most versatile electroplating and finishing departments in the Dominion, and AES visitors, expectedly, will have opportunity to inspect it. That department is a veritable empire. It's got everything—and the visiting plater will have a businessman's holiday viewing and examining and comparing. It will be one of the rewards for joining the AES throngs that will converge upon Montreal for the Society's 44th Annual Convention, June 16–20, 1957.

TRANSPORTATION

Montreal is well-served for your convenient travel by air, train, bus or highway.

By Train

Montreal's two main railway terminals, Central Station and Windsor Station, are located in the heart of the city, within a stones throw of the leading hotels, into which run trains from all major cities in Canada and the United States. Convenient connections are available from anywhere on the continent.

By Air

Montreal airport is served directly by TCA, Eastern Airlines, Colonial Airlines, Northeast Airlines, BOAC, Air France and KLM (Dutch) Airlines. Direct bus and taxi schedules to your hotel.

By Bus

Greyhound Lines and Provincial Transport offer service in modern, comfortable coaches, by means of their comprehensive network throughout Canada and the United States.

By Car

Good highways lead to Montreal from all points of the compass. You will find courteous and friendly traffic officers on the highways and in the city to direct you.

Take a train, plane, bus, or drive—but *come* to the AES Convention in Montreal, June 16–20, 1957.

PREVIEW OF YOUR MONTREAL ODYSSEY

Quarts in Montreal—whether milk or other "liquids"—contain 40 ounces.

Many French newspapers are available which you could send home to educate, amuse, and confuse your friends, all at the same time.

Night classes, for those interested, will be held in the leading night-clubs, which in themselves are a liberal education.

Sunday, June 16—Registration.

Come early, meet old friends, make new ones. Get your tickets to dinners, trips, and other functions early. Don't miss the "early birds'" reception, Sunday night. Be here right at the beginning.

Monday, June 17—Ladies.

At high noon, the battle of the calories begins with the first of several luncheons planned for you. Let's face it, girls, you are liable to gain a few pounds in Montreal, but it will be worth it.

Monday Afternoon, Gentlemen.

The afternoon starts you off on the technical sessions and your first opportunity to enjoy a most important feature of the Convention, never shown on any program. It is the small group meetings where experiences and troubles are exchanged, and one helps the other out of plating or technical difficulties. Bring your troubles to Montreal and leave them here (plating troubles, that is).

Monday Evening, Ladies & Gentlemen.

At the open house, come and dance away the cares of the day.

Tuesday, June 18—Ladies.

Start the day with some play, the Plato Party, from which we hope you will leave gift-laden for the Aunt Ella Luncheon, always a delightful highlight of the Convention. Your afternoon is free to shop, snooze, or do as you please.

Tuesday, Gentlemen.

The biggest day of the Convention for education—morning and afternoon and—

Tuesday Evening.

More education. Movies in color. Canada produces 90 per cent of the free world's nickel. A splendid full length film, in color, on the busy voyage of nickel before it becomes anodes will be presented, courtesy of the International Nickel Company, showing many of the aspects of the mining and milling of the nickel necessary to make, today, that very rare item, the nicked anode, which we are sure some of the old time platers will remember.

Wednesday, June 19.

Still more education for everyone. Leaving the plating and technical sessions in the forenoon, the gentlemen will join the ladies in the transition from the technical to the geographical and gastronomical education of the afternoon outing and luncheon in the Laurentians. On your return you will have time for forty winks before the dance and floor show, where you can laugh a little, and dance a lot—or vice versa, if father is too tired for dancing.

Thursday, June 20.

For the Ladies, The Odylite Luncheon.

For the Men, The Affairs of State of the Society, and the Final Business Session.

Thursday Evening—For All.

The farewell banquet and dance, and time for au revoirs—*until we meet again.*

BUSY MONTREALERS TAKE TIME OFF FROM CONVENTION PLANNING
Montreal Convention Chairman G. Ross Davidson (center) with members and out-of-town guests at the Branch's Annual Dinner Dance recently held at the Queen's Hotel, Montreal. Mrs. Davidson, Ladies Committee Chairman of the coming convention, at his right.

Why

TRERICE

Temperature Control

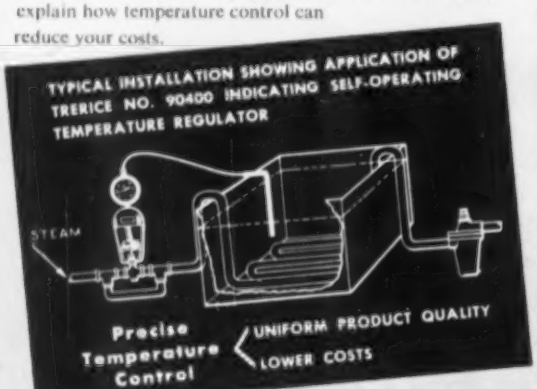
. . . in Plating and Metal Finishing Operations?

WHY temperature control? First of all, to assure uniform quality; second, to reduce processing costs.

Maintaining bath temperatures at the *one best level* used to be a serious problem. But not anymore. Today, TRERICE controls are automating plating processes throughout the metal finishing industry . . . maintaining precise temperatures *automatically*—TRERICE regulators prevent evaporation losses, cut down on rejects, insure uniform product quality! You save time, labor and fuel costs. Not surprising, then, that TRERICE controls are standard with leading original equipment manufacturers. Behind this wide acceptance is the TRERICE reputation for quality, and a nation-wide sales and service organization.

The TRERICE line is a *complete* line. Each TRERICE temperature control installation is set up to meet the specific requirements of the user, insuring uniform product quality at the lowest cost.

If your operation involves cadmium, chromium, copper, nickel, tin or zinc plating; anodizing, bonderizing, cleaning, pickling or rinsing, it will pay you to have a "Trerice Man" explain how temperature control can reduce your costs.


TYPICAL INSTALLATION SHOWING APPLICATION OF TRERICE NO. 90400 INDICATING SELF-OPERATING TEMPERATURE REGULATOR
STEAM
Precise Temperature Control
UNIFORM PRODUCT QUALITY
LOWER COSTS

Send Today for Bulletin 803—TRERICE TEMPERATURE CONTROLS for the Metal Finishing Industries

H. O. TRERICE CO. 1424 W. Lafayette Blvd., Detroit 16, Mich.

Factory representatives in principal cities of U.S. and Canada

PATENT ABSTRACTS

DR. D. GARDNER FOULKE
Manager, Electrochemical Development
Hanson-Van Winkle-Munning Co
Matawan, New Jersey

Copies of patents may be obtained by writing to Commissioner of Patents, Washington, D. C. Price 25 cents each.

No. 2,758,075, August 7, 1956—Electrodepostion of Tin—D. Swalheim, assignor to E. I. du Pont de Nemours & Co., Wilmington, Del.

In the process of plating steel strip with tin from the stannous chloride-fluoride bath is improved by effecting agitation and aeration by means of nitrogen. Decreased sludge formation results.

7 claims, 3 figures.

No. 2,758,076, August 7, 1956—Bright Acid Copper Plating—F. Passal, assignor to Metal & Thermit Corp., New York, N. Y.

Addition agents to an acid copper solution consist of a first compound selected from the class consisting of 2-mercapto-benzimidazole and derivatives thereof having in the six member ring an amino (or substituted amino) radical in the amount of 0.0005 to 0.3 g/l and a second compound consisting of thiourea and acyl derivaties thereof in the amount of 0.03—0.0005 g/l.

14 claims.

No. 2,758,372, August 14, 1956—Apparatus for Burnishing Aluminum Die Castings—C. Benedict, assignor to Roll-Brite Corporation, White Plains, N. Y.

The apparatus in described as a barrel to contain burnishing materials and mounted to rotate about a longitudinal axis, said barrel haying one open end and a removable cover therefor along with a mounting means for an article supporting rack in said barrel consisting of an elongated shaft mounted on the other end of the barrel. The rack slides on and off the shaft through the open end of the barrel.

2 claims, figure.

No. 2,758,949, August 14, 1956—Alkali Metal Phosphate Coating Solutions—H. Ley, et.al., assignor to Parker Rust-Proof Co., Detroit, Mich.

An improved alkali metal phosphate solution consists of an aqueous acidic solution of an alkali metal phosphate and a metallic ion sequestering agent from the group consisting of polyphosphates (1-20 g/l) and acetic amino acids and metallic salts thereof (0.77-7.7 g/l as ethylene diamine tetraacetic acid.) The pH is between 3 and 6.

Example 1 gives the composition of the concentrate as:

NaH_2PO_4	212 g/l
H_3PO_4	63 g/l
$NaClO_3$	118 g/l
$NaNO_3$	15 g/l

One part of concentrate is diluted with 24 parts of water and the pH adjusted to 4.5.

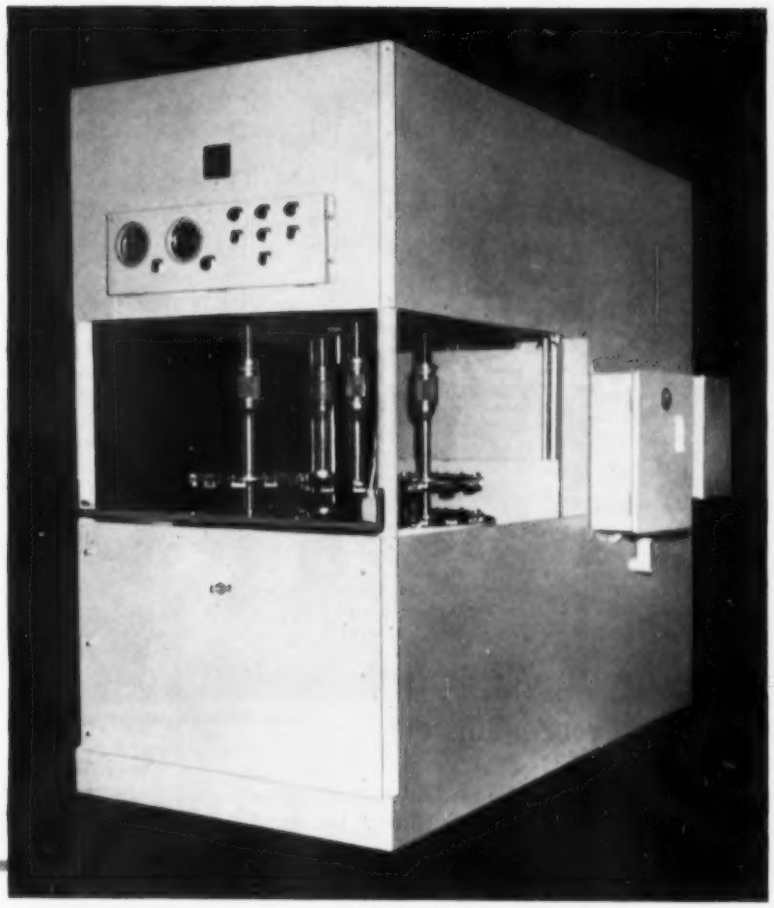
As the solution is used for treating the steel it takes on a cloudy appearance and sodium ethylene diamine tetraacetic acid is added.

8 claims.

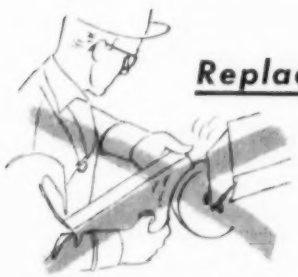
TUMBLE
GRAV-I-FLO
FINISH

OFFERS

Spin-Finish



AN ENTIRELY NEW PARTS-FINISHING PROCESS



Replaces hand and automatic buffing!

- ☑ One-operation finishing, even of the most complex parts
- ☑ Completely dry process . . . no lubricants needed
- ☑ Dust and fume free . . . no need for exhaust or ventilating systems
- ☑ No set-up time required for changing jobs

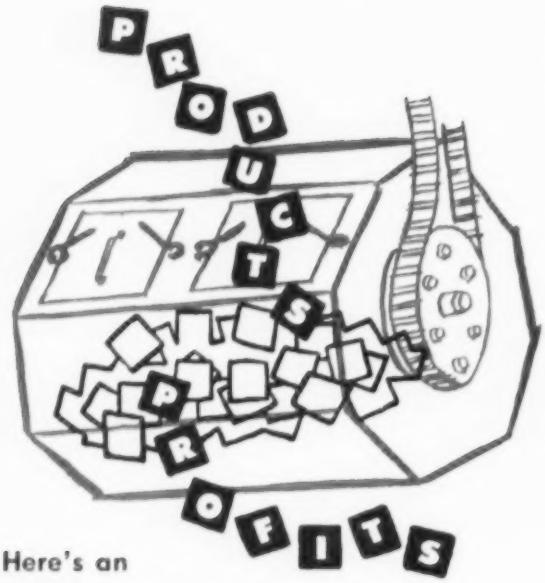
Sets New Standards In Pre-Plating Finishing Costs

Wipe the slate clean of all present concepts of speed, efficiency and costs in pre-plating finishing of brass, zinc-base and aluminum die-cast parts! In one short, automatically-timed operation—and on a *multiple mounting* of parts—new SPIN-FINISH produces surfaces and lustre equal to or surpassing that of buffing.

Savings on time, labor and plant space are tremendous! Eliminated are vast exhaust and ventilating systems! You'll want to learn all about this startling revolutionary method of finishing. Write for complete information now.

GRAV-I-FLO CORPORATION

Dept. PL-3, 400 Norwood Avenue, Sturgis, Michigan



Here's an exciting new game:

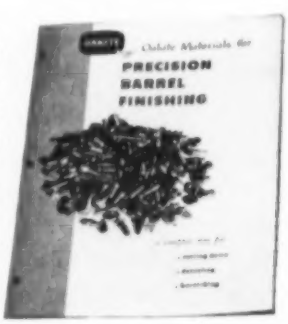
PUT your products in the barrel
TAKE your profits out

One of the greatest money-saving opportunities in metal-working lies in the use of barrels to finish parts by the hundreds in place of conventional methods that finish one part at a time.

Barrel finishing makes easy work of many tough jobs of grinding, deburring and buffing by wheel.

One Oakite customer changed to barrel methods to deburr curved stainless steel strips that are 14 inches long. The cost for deburring 20,000 strips was reduced from $3,000 to $125.00.

FREE For a copy of *"Precision Barrel Finishing"*—containing valuable information on cutting down, deburring, descaling, and burnishing—write to Oakite Products, Inc., 40 Rector St., New York 6, N. Y.



OAKITE

Export Division
Cable Address: Oakite

Technical Service Representatives in Principal Cities of U. S. and Canada

PATENT ABSTRACTS

No. 2,758,950, August 14, 1956—Producing Steel by Electroforming and Carburization—J. Lakner, assignor to United States of America (Atomic Energy Commission)

The method consists of electroforming iron on a refractory carbide material, such as tungsten, titanium, zirconium, etc., carbides, after which the iron shell is carburized on said refractory mold.

4 claims.

No. 2,758,961, August 14, 1956—Electroformed Iron Articles—L. Koswsky, assignor to Columbia Records, Inc., Bridgeport, Conn.

The single claim states: "The method of producing negative matrices consisting preponderantly of iron which comprises immersing a cathodic mother in an aqueous electrolyte of ferrous chloride and calcium chloride and under reducing conditions at a pH of less than 1.5 and at a uniform temperature, maintaining the mother stationary at a relatively low current density about 10 amp/sq ft until a layer of iron about .0005 in. thick has been deposited, and then effecting a back and forth movement of the mother and increasing the current density to deposit the major part of the iron.

No. 2,758,962, August 14, 1956—Method of Electroplating—H. Luechauer, assignor to General Motors Corp., Detroit, Mich.

This method refers to the plating of semi-circular objects such as bearings and a racking method is described in two figures and three claims.

No. 2,758,963, August 14, 1956—Electrodeposition of Plutonium Fluoride—M. Kahn, assignor to United States of America (Atomic Energy Commission)

Plutonium fluoride is deposited from an aqueous plutonyl nitrate bath containing a large excess of fluoride ions at 7v whereby the plutonium is reduced and an insoluble fluoride is deposited on the cathode.

1 claim, figure.

No. 2,759,848, August 21, 1956—Deposition of Metal Films from Carbonyls—M. Sullivan, assignor to Bell Telephone Laboratories, Inc., New York, N. Y.

The metal carbonyl is decomposed to deposit a metal film on a body in the presence of a catalyst such as silicon tetrachloride or titanium tetrachloride.

7 claims, figures.

No. 2,759,862, August 21, 1956—Method of Treating Ferrous Surfaces—J. Hendricks, assignor to Derex Corp., Cleveland, Ohio.

An adherent coating may be formed on ferrous surfaces for subsequent drawing operations by immersing in an aqueous bath at 190 F of the following composition:

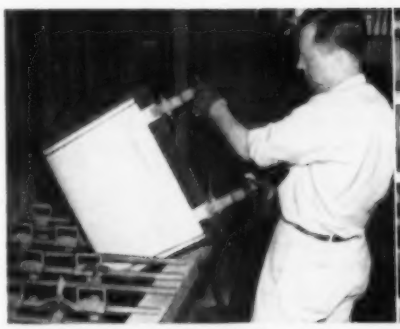
	Per Cent
Oxalic acid	4-15
Sodium acid sulfate	2-5
Sulfur	0.5-10
Boric acid	0.5-5
Sodium thiosulfate	0.5-2.5
Protective colloid	0.5-3
Wetting agents	0.01-3
Water	Remainder

Some claims mention the introduction of SO_2 into the bath too.

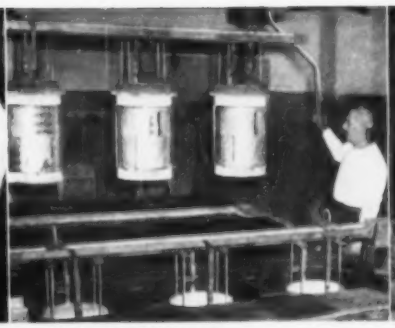
10 claims.

No. 2,759,886, August 21, 1956—Process for Treating Steel—H. Priest, assignor to United States of America (Atomic Energy Commission).

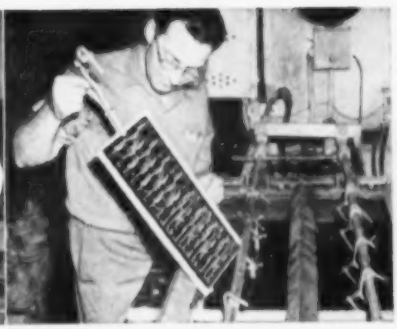
The metal article is immersed in a fused bath containing a



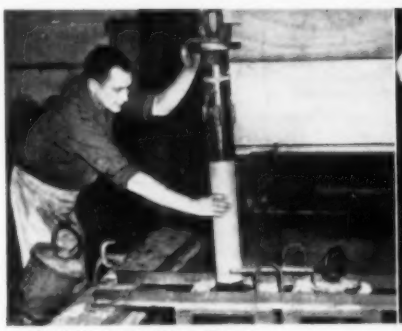
Plating Electrotype Shells



Plating Stereotypes

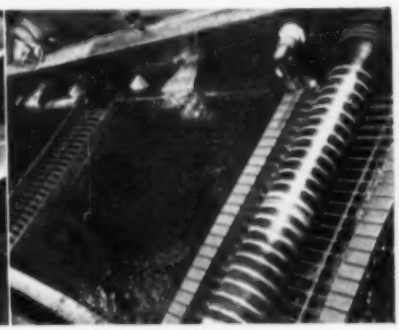


Plating Printed Circuits



Building Up Worn Parts

Plating Versatile Lead-Tin Alloys



High Speed Wire Plating

You can electroplate 10 ways better

with B&A FLUOBORATE Plating Solutions

LEAD

TIN

IRON

COPPER

NICKEL

CADMIUM

INDIUM

1. No mixing or dissolving necessary . . . supplied in concentrated solution form
2. Easier bath preparation
3. Stability of bath composition
4. Ease of control
5. Practically 100% anode and cathode efficiencies
6. High conductivity
7. Good covering power
8. Fine-grained deposits of good color
9. Faster, high-speed operation
10. Readily adaptable for alloy deposits: lead-tin and lead-tin-copper alloys

FINE CHEMICALS B·A REAGENTS

AND MANY MORE ADVANTAGES . . .

. . . enabling you to increase production . . . lower your operating costs . . . get easier, simpler operations. In addition to the advantages listed, each fluoborate bath offers a number of special advantages for its particular applications.

Here is the *modern* way to electroplate. Mail the coupon now for complete information.

BAKER & ADAMSON® *Fine Chemicals*
GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

Please send me, without cost or obligation, complete technical data on the use of fluoborate solutions for the following plating applications

_____

Name_____

Title_____

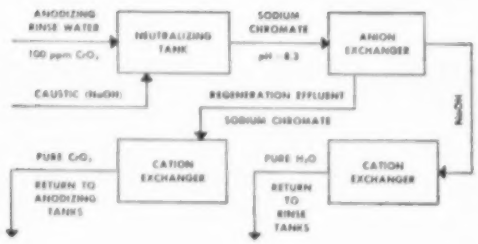
Company_____

Address_____

City_____ Zone____ State_____

PL-3

ILLCO-WAY
ionXchange



RECOVERY OF CHROMIC ACID FROM ANODIZING RINSE WATER

The block diagram above indicates one method of using ionXchange to save money, in the plating rooms of a large automobile plant, by recovering the chromic acid from the rinse tanks of anodizing operations. The cost of equipment was much less than the cost of a disposal plant, and the savings through recovery were substantial enough to make the investment a very profitable one.

REMOVAL OF ALUMINUM FROM ANODIZING BATH

A secondary purpose for one part of the same installation was the removal of aluminum from the anodizing baths. When the concentration of aluminum in any anodizing tank rose to nearly 1 g. per liter, that tank was cycled through the cation exchanger and the aluminum removed, thus saving over $250 a week compared with partial dumping. *For details on this and many other money-saving applications of ILLCO-WAY ionXchange, write us or consult your Illinois Water Treatment Company representative.*

ILLINOIS WATER TREATMENT CO.
840 CEDAR ST., ROCKFORD, ILLINOIS

ILLCO-WAY ionXchange

NEW YORK OFFICE: 141 E. 44TH ST., NEW YORK 17, N.Y.
CANADIAN DIST. PUMPS & SOFTENERS, LTD. LONDON, ONT.

PATENT ABSTRACTS

fluoride compound, reducing the melting point of said compound by HF through the melt which establishes an electric circuit through the bath with the article as the anode, thereby coating said article.

9 claims, figure.

No. 2,759,888, August 21, 1956—Electrolytic Pickling Apparatus—G. Rendel, assignor to U. S. Steel Corporation, N. J.

An electrolytic pickling apparatus is described consisting of two conductor rolls, one at entrance of strip into pickling tank and a second at the exit position. A plurality of electrodes are arranged in tandem along the strip and connected to individual generators, the other leg of the generator being connected to the entrance and exit rolls. By this means the current density in the various passes can be maintained without use of intermediate conductor rolls.

4 claims.

No. 2,760,927, August 28, 1956—Process for Electrolytic Cleaning of Metals—H. Webster, assignor to Kolene Corp., Detroit, Mich.

The bath in which articles may be cleaned is prepared by fusing a mixture of alkali metal hydroxide, at least 75 per cent by weight, with an alkali metal borate, 1–15 per cent by weight. The article is then immersed in the molten bath and an electric current passed through.

16 claims.

No. 2,760,928, August 28, 1956—Apparatus for Electroplating Studies—Myron Ceresa, Pittsburgh, Pa.

A Hull cell is described containing a heating element in a depression in the flat face of the base of the cell. The solution then is heated throughout the cell by convection flow.

5 claims.

No. 2,761,792, September 4, 1956—Preparing Aluminum Cables for Soldering—R. Wasserman, assignor to Entectic Alloys Corp., New York, N. Y.

The four step process consists of: (a) treating with magnesium silico halide, (b) autocatalytic contact with a nickel plating solution, (c) treating with a deoxidizing, fluxing, cleaning rosin-alcohol solution and (d) finally tinning with solder.

4 claims.

No. 2,761,828, September 4, 1956—Method of Forming Internally Flanged Structures—A. Eldridge and E. Ginzton, assignors to Stanford University, Stanford, Calif.

An electroforming method for making a disc-loaded homogeneous, internally flanged cavitied structure of exact internal volume is described.

6 claims.

No. 2,761,831, September 4, 1956—Electroplating Fixtures—H. Luechauer, assignor to General Motors Corp., Detroit, Mich.

A rack for plating semicircular work pieces such as bearings is described.

1 claim, figure.

No. 2,762,115, September 11, 1956—Protecting Hot Extruded Metal—N. Gates, assignor to American Brass Co., Waterbury, Conn.

The method consists of establishing an alkyl borate vapor atmosphere at the exit of the die. The decomposition products of the borate protects the shape from oxidation.

4 claims, figure.

World's Finest Anode for Chromium Plating

TRAMER

"COPPER CORE" Chromium Anode

"Copper Core" is chemically bonded homogeneously to the lead for its entire length. The entire hook is lead covered for additional protection.

- **This Anode** will conduct 250 amperes based on copper area alone.

  Natural flow of current makes entire surface self-cleaning, insuring complete saturation, instant distribution of current, and unusual throwing power. Greatly reduces plating time for a given thickness of deposit.

- **"Copper Core"** distributes currents equally throughout the entire length of anode.

  The anode is insulated above and below the solution level—which prevents flow of heavy surface currents and burning off at solution line. Conductivity is uniform at all solution levels, regulated only by the cathode depth.

- **"Copper Core"** and point current construction, aids in immediate coverage.

  A one-piece copper hook maintains perfect contact —no heating at point of contact, no current failures to solution. "Copper Core" Anodes do not warp out of shape.

The GILBERT TRAMER Co.

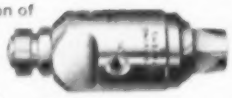
POLISHING • PLATING and CHEMICAL • EQUIPMENT

1217 MAIN AVE. CLEVELAND 13, OHIO PRospect 1-2751

to give you better

SPRAY NOZZLES

• Shown above is a portion of Spraying Systems' own research facilities. Here the variables of nozzle design, fluid properties and operating conditions are studied and measured . . . to provide original data for better design and improved performance wherever spraying is involved.



WRITE FOR Catalog 24 . . . contains forty eight pages of complete information on thousands of nozzle types and capacities.

SPRAYING SYSTEMS CO.
3227 RANDOLPH STREET • BELLWOOD, ILL.

ADVANCED SPRAY NOZZLE DESIGN FOR NEW DIMENSIONS IN CONTROL AND PERFORMANCE

USE READER SERVICE CARD; INDICATE A 347.

For ALL Your Metal Finishing Needs Depend on DAVIES

The Southwest's Leading Supplier of Industrial Plating and Polishing

- COATINGS
- CHEMICALS
- PLATING RACKS
- ABRASIVES
- EQUIPMENT
- ENGINEERING

Davies
Supply & Manufacturing Co.
4160 Meramec St. • MOhawk 4-9332 • ST. LOUIS 16

301 N. Market St. • RI 7-5423 • Dallas 1
813 W. 17th St. • BAltimore 1-2128 • Kansas City 8

PATENT ABSTRACTS

No. 2,762,149, September 11, 1956—Method for Producing Perforated Metal Webs—N. Mears, assignor to Buckbee-Mears Co., St. Paul, Minn.

An elongated blank with exposed and masked areas is passed along a path at which time an etching solution is made to impinge against the cleaned face of the blank.

14 claims, figure.

No. 2,762,714, September 11, 1956—Method of Making Silver Mirrors—E. Smith and J. Fitzgerald, assignors to Pittsburgh Plate Glass Co., Pittsburgh, Pa.

The method of coating objects with a tenacious layer of one of the precious metals particularly on glass or ceramics is claimed. The ceramic material (or metal) is immersed in a solution of a reducing salt, then rinsed in a salt solution of the precious metal having substantially no reducing agent therewith. The procedure is repeated for a predetermined number of cycles. Stannous chloride is mentioned as a reducing agent.

27 claims.

No. 2,762,728, September 11, 1956—Steel Pickling Process—E. Hahn, assignor to Lyon, Inc., Detroit, Michigan.

The method for wrought stainless steel involves immersion in an aqueous sulfuric acid (5–20 per cent by weight) and nitric acid (5–20 per cent by weight) solution at 120–180F.

10 claims

No. 2,762,729, September 11, 1956—Method of Removing Scale from Ferrous Workpieces—R. Snow, assignor to U. S. Steel Corp.

The surface of the ferrous body is heated to 1080 to 1400 C. and while at that temperature said surface is contacted with a lime containing material in solid form.

5 claims.

No. 2,762,731, September 11, 1956—Method for Producing Paint Bonding Felons on Ferriferous Metal Surfaces—F. Heller and F. Spruance, Jr., assignors to American Chemical Paint Co., Ambler, Pa.

The clean surface of the metal is in a bath at a pH of 0.8 to 5.5. The approximate composition of the bath is as follows:

Chloride (as ammonium chloride)	0.05 –17 per cent of solution
Complex fluoride (as ammonium fluosilicate)	0.5 part to 20 parts for each part of Cl^-. Not less than 0.025 per cent of solution.
Chromate (as CrO_3)	0.03–5.0 total of Cl^- and F as NH^+_4 salts.

6 claims.

No. 2,762,732, September 11, 1956—Solution for Cleaning and Coating Metal Surfaces—R. Somers, assignor to Parker Rust Proof Co., Detroit, Mich.

The solution for cleaning iron, aluminum zinc and alloys thereof consists of: 40–90 parts by volume of 3° butyl alcohol, 10–60 parts by volume of hydrocarbon solvent, up to 30 parts by volume of water and 0.025 per cent–10 per cent chromic acid by weight of solution.

9 claims.

No. 2,762,763, September 11, 1956—Process and Apparatus for Simultaneously Drawing and Plating Wire—H. Kenmore and W. Manson, assignors to National Standard Co., Niles, Mich.

An apparatus is described which is adapted to plate wire under the high, substantially uniform, tension required to draw the wire to a smaller diameter. Three claims and four figures describe the apparatus.

USE READER SERVICE CARD; INDICATE A 348.

INDUSTRIAL ENGINEER AT ALCO VALVE CO. REPORTS...

"We stepped up parts production 700% by deburring and polishing with ALMCO EQUIPMENT"

MR. HAROLD KRAUSHAAR, Industrial Engineer at Alco Valve Co., St. Louis, shows solenoid valve parts on which Almco barrel finishing equipment recorded vital production increases.

KEEPING PACE with over-all stepped-up plant production requirements was not easy at Alco Valve when it came to finishing of piston and plunger valve parts.

These stainless steel screw machine parts were being deburred and polished by hand at the rate of slightly over 200 per hour.

It threatened to become a bottleneck, and in addition, stricter finishing specifications were calling for 25 micro-inch on both plungers and pistons, further increasing man hours.

FINISHING PRODUCTION SOARED — After detailed lab analysis and testing procedures on typical parts by Almco engineers, an Almco Model DB-400 barrel finishing machine was installed. Production rate on deburring and polishing rose from 200 per hour to over 1400 per hour — a direct increase of 700%! Plant production schedules were met without difficulty.

REJECTS PRACTICALLY ELIMINATED — The Almco method of deburring and finishing not only mastered the stricter micro-inch requirements, but cut rejects to a bare minimum. Since hand operations were completely eliminated, costly variables were no longer present.

MODERN TECHNIQUES IN BARREL FINISHING — It will pay you to investigate what Almco barrel finishing can do for your company. Almco's technician-staffed laboratories can help you by examining your product parts, running them through detailed sample processing to determine what combination of machine, compound, media, cycle, etc., will produce the results you want, at lowest possible cost.

All you have to do to get a complete report with absolutely no obligation is to write Almco, asking an engineer to call and arrange it. Or, send sample parts and specifications on results desired direct to Almco's main laboratory at Albert Lea, Minnesota.

You will be interested to know that Almco case history reports now cover a tremendously broad variety of parts, metals, and finishes. Get information on your requirements now!

Deburring and polishing of piston parts is a smooth one-operation process at Alco Valve. After O.D. centerless grinding and angle seating, parts are processed to tight specifications in this Model DB-400 Almco machine.

SEND FOR THIS NEW BARREL FINISHING HANDBOOK

Complete description of the most advanced modern processes. 52 pages of facts, photos, data and cost comparison charts. Write for your personal copy today.

ALMCO

DIVISION OF QUEEN STOVE WORKS, INC.

63 Marshall Street • Albert Lea, Minnesota

Sales Engineering Offices in Chicago, Detroit, Los Angeles, Newark, New Haven, Philadelphia and London, England

Inaugurating the Organic Division of Milwaukee Branch on December 7. (left to right) Ezra Blount, presenting paper on Paint Application; Sylvester Taterzynski, Branch Secretary and Treasurer; Herman Tessmann, Branch President; Ralph D. Wysong, AES Third Vice President and National Chairman, Special Organic Coating Committee.

Milwaukee Deals With The Allied Arts

by Leslie Diveley*

> The object of the Society shall be the improvement and dissemination of the knowledge of the arts and sciences of electroplating and of finishing of metals and of allied arts . . . *From the constitution of the American Electroplaters' Society.*

The members of the Milwaukee Branch have always believed that the statement of the scope of the Society was proper and intentional. The Branch has, therefore, pursued a policy of inviting the membership of non-plating metal finishers and providing them with appropriate educational programs and a forum for the discussion of their problems.

In theory those programs and discussions should have benefited all of the members because all to some degree finished metals by some methods other than by electroplating. However, in practice it was very difficult to arrange meetings that would appeal to the platers and non-platers alike. For example, many platers believed that their interest in organic coatings was confined to the occasional application of lacquer and they failed to attend meetings whose programs departed too far from that minimum subject matter. On the other hand, few metal painters could be persuaded to listen to discussions of electroplating subjects.

People engaged in the organic finishing of metals had long felt the need for a technical organization to deal with their art, but they wanted to take a full share in the activity of that organization and they were not satisfied with an occasional program. No one wanted to be a part-time member of a technical society.

Separate Divisions Permit Greater Expansion

The Branch Managers concluded that the only way in which they could meet their full responsibility under the constitution was to organize the membership into divisions of narrower interest. They did not believe that the moderate size of the Branch was a serious handicap inasmuch as the area served by the Branch contained as many non-plating metal finishers (and therefore potential members) as it did platers. The Managers argued that separate divisions would permit unlimited expansion without reducing any services to existing members.

The By-Laws were accordingly amended as follows:

> The membership of the Branch shall be separated into Divisions for the purpose of furthering the specific interests of the members. A member may enroll in as many Divisions as he chooses. Each Division may enact supplementary By-Laws to fit its needs, but in no instance may the By-Laws of a Division contradict or oppose in any manner the By-Laws of the Branch or the Constitution and By-Laws, as amended, of the American Electroplaters' Society.

The Branch agreed that it would provide a meeting room and arrange programs for any Division that could guarantee a regular attendance of at least fifteen members.

An enthusiastic committee was formed to promote an Organic Division. The committee consisted of C. Doria of Cutler-

*Finishing Engineer, Cutler-Hammer Inc., Milwaukee, Wisc.

Attentive group at first session of Milwaukee Branch's Organic Division

Hammer, Inc.; John Wagner of The American Marietta Co.; B. Coughlin of Standard-Toch Chemicals, Inc.; and H. Wieley of Pittsburgh Plate Glass Company. The chairman was foreman of a painting department and the remaining members were sales and service engineers of supply companies.

First Meeting Draws Large Attendance

The first meeting of the Organic Division was held on December 7, less than 60 days after the first action had been taken. Sixty-nine people attended that meeting to hear Ezra Blount, editor of *Products Finishing*, present a comprehensive review of Methods of Paint Application.

The Board of Managers had anticipated difficulties in conducting simultaneous meetings but it decided that creation of the Division was more important than perfection and that operational problems should be solved as they occurred. Adequate space could not be obtained in the regular meeting hotel on short notice so the December meetings were transferred to a nearby lodge hall. Additional assistant librarians were appointed to handle meeting details. Special mailing lists were compiled, invitations sent, and a reception committee was on hand to greet visitors at the meetings.

The Educational Committee had decided that the Organic Division programs should be arranged to appeal to paint users and technical service men rather than to paint production chemists. The programs would not, therefore, be greatly concerned with research in the organic field. A survey had convinced the Committee that a great amount of material was available. That material included such items as: methods of paint application, preparation of metal surfaces, uses for primers, maintenance of color, manipulation of viscosity, inclusion of special purpose pigments, selection of resins and types of paint, use of additives, application of dyes and inks, graining, quality testing, and material handling. While papers dealing with those subjects would be considered to be reviews, discussion arising from their presentation should be beneficial.

The Membership Committee estimates that organization of the Organic Division will result in a net increase of fifty members during the first year. The Officers of the Branch are now convinced that the only method by which any Branch, large or small, can achieve the full purpose of the Society is by vertical organization in divisions. That method will provide a flexible service organization for special educational activities and at the same time retain close contact for members with common interests.

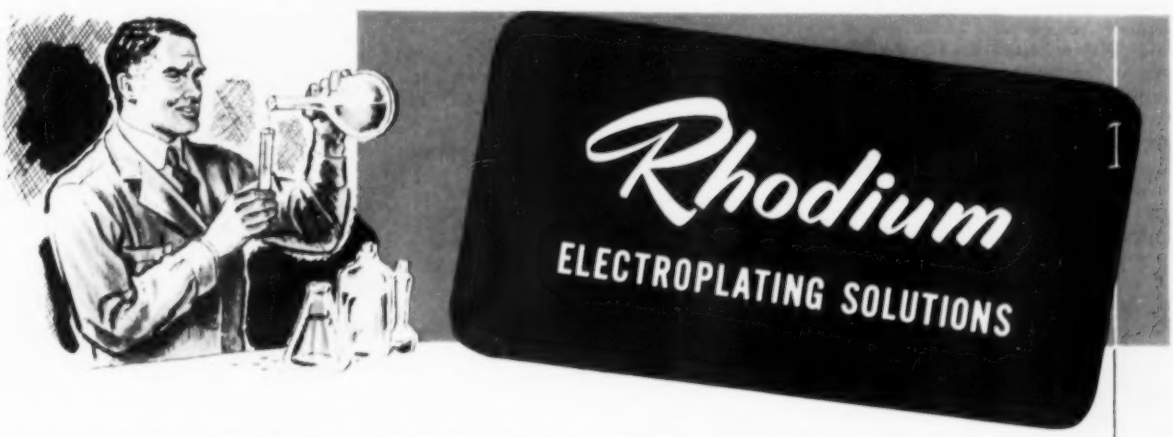
Manual Available to Branches

The AES's consolidated mimeographed looseleaf book Branch Officer's Manual has been completed and copies have issued from National Headquarters to all Branches that ordered them at $5.50 per copy.

Within red covers bound by Chicago screws, the Manual contains information on respective phases of Branch operation vital to the successful workings of every AES Branch. It includes five final supplements.

A limited extra quantity of the book is still available at National Headquarters for the accommodation of Branches that have not previously ordered copies. These will be sold to Branches (only), on a first-come, first-served basis so long as that supply lasts, at $5.50 per copy, including postage to one destination.

Write American Electroplaters' Society, Inc., American Building, 445 Broad Street, Newark 2, N. J. Payment should accompany order to obviate unnecessary bookkeeping expense.



Rhodium Plating for jewelry offers the advantages of whiteness, lustre and corrosion resistance . . .

For electrical and other applications: protection from corrosion in air or unusual conditions . . . Particularly recommended for printed circuits and contact surface . . .

Can be applied to many surfaces from less than one to one hundred milligrams per square inch . . .

Consult our staff, without obligation, about your specific plating problems.

SINCE 1901

Specialists in the Unusual

SIGMUND COHN MFG. CO., INC.
121 SOUTH COLUMBUS AVENUE • MOUNT VERNON, NEW YORK

FILTER any size tank every hour...
(or even faster)
with **Fulflo** FILTERS

No matter what size plating tanks you use — you can filter them *completely and continuously* every hour, every half-hour, or even faster with Fulflo Filters. Reduce costly rejects while maintaining a higher grade of plating.

Fulflo employs genuine Honeycomb Filter Tubes, with positively controlled densities to meet your exact requirements for any degree of micronic clarity. Steel containers and cotton filter media resist almost any alkaline solution. For acids, you have a choice of stainless steel or rubber-lined steel containers with dynel filter elements.

Fulflo Filters are extremely compact. They can be easily installed on individual tanks where space is limited, making possible continuous micro-fine filtration of any size tank.

Commercial Filters Engineers are ready to help you with any problems involving micro-fine filtration of plating solutions. For technical literature, write to Department PL.

COMMERCIAL FILTERS
CORPORATION
MELROSE 76, MASSACHUSETTS

Plants in Melrose, Massachusetts and Lebanon, Indiana

ARTICLE REFERENCES

By
WILLIAM M. TUCKER
Eastman Kodak Co.
Rochester, N. Y.

Most of the articles listed here may be obtained by writing to the Publication. Addresses are included for the reader's convenience.

Photostat or microfilm copies of articles in available magazines may be obtained from: Library of Congress, Washington, D. C.; New York Public Library, New York; Engineering Societies' Library, New York, at prevailing rates. In other cases, consult Wilson's Union List of Serials at your nearest public library for other sources of these articles.

226. ALLOY

a. *ELECTROLESS ARSENIC-ZINC ALLOY.*
Harry J. West.
Metal Finishing, *55*, No. 1, January 1957, p. 56.

227. ALUMINUM

a. *STUDIES OF THE MECHANISM OF BRIGHTENING OF ALUMINUM AND ALUMINUM ALLOYS. II. (German).*
F. Baumann and H. Ginsberg.
Aluminium, *32*, No. 11, November 1956, p. 706–711.

b. *SURFACE TREATMENT AND FINISHING OF ALUMINUM AND ITS ALLOYS. (Book)*
S. Wernick and R. Pinner.
580 p. 1956. Robert Draper Ltd., 85 Udney Park Road, Teddington, Middlesex, England. $11.75.

228. CHROMIUM

a. *CHROMIUM PLATING OVER A CHROMATE FILM. A PRELIMINARY STUDY.*
John E. Hoover.
Products Finishing, January 1957, p. 46–49.

b. *CHROMIUM PLATING FROM THE TRIVALENT BATH.*
Melvin R. Zell.
Metal Finishing, *55*, No. 1, p. 57–58.

229. CORROSION

a. *CONTAMINATION AND CORROSION IN RAIL TANK CARS.*
S. John Oechsle, Jr. and Kenneth G. Le Feyre.
Corrosion Technology, *3*, No. 12, December 1956, p. 389–392. (Corrosion Technology, Stratford House, 9 Eden St., London, N.W., England).

b. *KNOW STAINLESS STEELS WHEN SELECTING FOR EQUIPMENT.*
W. E. McFee.
Industrial and Engineering Chemistry, November 1956, *48*, No. 11, p. 1964–1970.

c. *PITTING AND CRACKING.*
U. R. Evans.
Chemistry and Industry, 1956, No. 44, November 10, 1956, p. 1291–1297.
"Starting places of attack, electrochemical reactions, healing and spreading, corrosion patterns on zinc and iron, pitting on aluminum, spots on tin, pitting on zinc in distilled water, pitting and dislocations, intergranular corrosion, intergranular weakening stress corrosion cracking."

230. ELECTROPOLISHING

a. *ELECTROLYTIC POLISHING OF METALS.*
Ivan Hrivnak. (Czech).
Hutnicke Listy, *11*, No. 10, October 1956, p. 599–611.
"Explains Jaquet-Rocquet theory and mechanism of polishing polyphase structures."

b. *CHEMICAL POLISHING OF V2A-STEEL WITH GASES (German).*
G. Schmid, E. Maurer and H. Steinhausen.
Metalloberfläche, *10*, No. 10, October 1956, p. 289–295.
"Application of nitrogen dioxide, hydrogen chloride and steam for steel polishing. Optimum procedures and temperature."

c. *PROCESSES DURING CHEMICAL AND ANODIC POLISHING OF METAL SURFACES (German).*
Helmut Brunner.
Metalloberfläche, *10*, No. 10, October 1956, p. 295–299.
"Requirements of electrolytes for polishing comparison of chemically polished and electrochemically polished surfaces. Practical applications."

d. *INVESTIGATION OF THE ANODIC PROCESS OF ALUMINUM ELECTROPOLISHING BY MEANS OF PERCHLORIC ACID-ALCOHOL ELECTROLYTES.*
V. Hansen and E. Knuth-Winterfeldt.
Metalloberfläche, *10*, No. 10, October 1956, p. 229–300. (German).
"Experimental Findings and two hypotheses of the reaction mechanism."

231. FINISHING

a. *GRIT BLASTING: AN AID TO CARBURIZING QUALITY.*
A. J. Schwarzkopf.
The Iron Age, January 24, 1957, *179*, No. 4, p. 71–72.

b. *POINTS TO REMEMBER IN USING ABRASIVE BELTS FOR FINISHING.*
Warren K. Seward.
Products Finishing, January 1957 — p. 36–45.

232. HARDNESS

a. *HARDNESS OF ELECTRODEPOSITED TIN-NICKEL ALLOY ON BRASS.*
V. R. Ramanathan.
Institute of Metal Finishing, Bulletin, *6*, Autumn 1956, p. 1–7.

233. ORGANICS

a. *HOW PLASTICS CURB CORROSION IN METAL PROCESSING.*
J. H. Lux.
The Iron Age, January 17, 1957, *179*, No. 3, p. 80–82.

234. POROSITY

a. *POROSITY DISPERSION IN ELECTROLYTIC COATING.*
Maurice Bonnemay. (French)

Journal de Chimie Physique, *53*, No. 9, September 1956, p. 688–690.
"Experimental data permit drawing of the frequency curve characterizing the porosity distribution of an electrolytic coating. The curve is projected by an extrapolation formula as a function of the thickness."

235. PREPARATION

a. *ELECTROPLATING ON BERYLLIUM.*
J. G. Beach and C. L. Faust.
Industrial Finishing (London), *9*, October 1956, p. 173–174.

236. PROTECTION

a. *PROTECTING STEELWORK FROM RUST. RESULTS OF SURFACE TREATMENT TESTS.*
Corrosion Technology (Stratford House, 9 Eden Street, London, N.W., England), *3*, No. 12, December 1956, p. 393–396.

237. TIN

a. *THE INFLUENCE OF SOME PROCESS VARIABLES ON THE REFLECTIVITY AND SURFACE APPEARANCE OF ELECTROLYTIC TINPLATE.*
R. Mills.
Institute of Metal Finishing, Bulletin, *6*, Autumn 1956, p. 8–17.

238. TUNGSTEN

a. *PLATING OF TUNGSTEN BY AN OXIDATION-REDUCTION CYCLE.*
M. G. Charlton and G. L. Davis.
Institute of Metal Finishing, Bulletin, *6*, Autumn 1956, p. 28–39.

239. ZINC

a. *AUTOMATIC PLATING OF ZINC DIE CASTINGS.*
Ernest W. Horvick.
Metal Finishing, January 1957, *55*, No. 1, p. 52–55.

Following are the addresses of the publications named in the Article Reference above.

Requests for articles should be made directly to the publication.

Chemistry & Industry
Society of Chemical Industry
56 Victoria Street
London, S.W. 1, England

Hutnicke Listy
Mucednicka 8
Bruun-Zabowresky
Czechoslovakia

Industrial Finishing
Arrow Press Ltd.
157 Hagden Lane
Watford, Herts, London
England

Institute of Metal Finishing
St. Ormond St.
London, W.C. 1, England

Iron Age
Chilton Co., Inc.
Chestnut and 56th Sts.
Philadelphia 39, Pa.

Journal de Chimie Physique
Societe de Chimie Physique
Ecole Nationale Superieure de Chimie
11, Rue Pierre-Curie
Paris (Ve) France

Metal Finishing
Finishing Publications, Inc.
381 Broadway
Westwood, N.J.

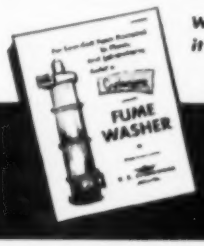
Metalloberflache
Carl Hanser
Zeitschriftenverlag GmbH
Munchen 27
Leonhard Eck Strasse 7
Germany

Products Finishing
Gardner Publications, Inc.
431 Main Street
Cincinnati, Ohio

The Cyclonaire is a "package" Fume Washer, complete with Intalox Saddle Tower Packing and motor. Unlike old fashioned "custom built" units, its compact design permits more advantageous location inside the plant — duct runs are shorter, power requirements are lower. It is available in four standard capacities: 750, 1,650, 3,500 and 6,000 c.f.m., which enables the user to "tailor" a fume removal system to his particular plant. For example: one plant may best be served by a single 6,000 c.f.m. unit, while another plant solves its problems by strategically placing two or more smaller units.

The Cyclonaire is easily adapted to special applications, too. In the majority of cases standard components are used, with no involved engineering or special parts fabricating required. Consider for a minute what this flexibility can mean in time and money saved . . .

The Cyclonaire removes up to 99.9% of many gases in concentrations of 1% or less, and safely handles corrosives in low concentrations. Each unit is fully Tygon-protected inside and out against corrosive fumes normally encountered in metal working operations. Constructed of steel in flanged sections, it can be assembled by two men in half a day—or as quickly disassembled and relocated. But you'll want the whole story, so . . .



Write today for Bulletin FW-5
it is yours without obligation

254-E

PROCESS EQUIPMENT DIVISION

U. S. STONEWARE

AKRON 9, OHIO

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 352.

INTERSOCIETY NEWS

Masters' Compares Operation Rates

In its Monthly Bulletin Masters' Electro-Plating Association published a table showing the rate of operations for 1956 of reporting members compared to 1953–1955. The rate of 1956 is based on the statistics for ten months, July and August are not included.

Because of the fact that the normally slow months of July and August were not included in the 1956 averages the rate of operations for 1956 shows up slightly higher than it otherwise would. It is estimated that the rate for 1956 should be closer to 64 per cent.

	1953	1954	1955	1956
A. Average No. of shops reporting	58	57	55	54
B. Weekly av. man-hours Cap. (1-shift)	100,775	101,250	90,924	89,780
C. Av. No. of shops reporting extra shifts	5	4	4	5
D. Av. No. of shops working overtime	15	13	15	13
E. Weekly av. No. of man-hours worked	68,436	64,193	62,278	58,536
F. Av. rate of operations (E/B)	67.9%	63.4%	67.4%	65.2%

Masters' Plan Banquet

The Masters' Electro-Plating Association of New York will hold its 39th annual banquet at the Plaza Hotel, New York City, on Saturday, May 11, 1957.

This is an outstanding event of the year in the industry. Suppliers, jobplaters and their friends from all over the USA attend.

The Masters' Electro-Plating Association was formed in 1918 with a few hardy pioneers. It has now grown to almost 100 members in the Metropolitan area. The Association has striven in every way to raise the technical, business and ethical standards of the Industry.

This year the popular Mariano Ranno, partner, Imperial Plating Co. of Brooklyn, is the banquet chairman.

Mr. Ranno is well known in the industry. As chairman of the Nickel Committee of the National Association of Metal Finishers, with which Masters' is affiliated, he sparked the year long drive for industry recognition and for the equitable distribution of nickel.

Sal. Novelli of Service Plating Co. is the chairman of the Association, Jesse Goldman of Grand Chromium Plating Corp. is vice chairman, and Frank Kaiser of Long Island Mechanical Plating Co. is treasurer.

S. C. Taormina is the executive secretary with offices at 59 East Fourth Street, New York 3, N. Y.

The cocktail hour will start at 6:30 p.m., followed by the banquet, dance, and entertainment.

New Plastics Engineers Officers

The executive secretary, James R. Davidson, of the Society of Plastics Engineers has announced the following newly elected officers of the Society: Peter Simmons of the Dow Chemical Company, president; Haiman Nathan of Atlas Plastics, vice president; R. K. Gossett of Gossett and Hill, secretary; and Jules W. Lindau III, of Southern Plastics and the University of South Carolina, treasurer.

Newly elected members of the Board of Directors of the Chicago Electro-Platers Institute met with outgoing Board Members at first meeting of new year on January 8, 1957. Representatives and their company affiliations are (left to right, standing): Erwin Elies, Berteau-Lowell Plating Works; Ray Crawford, Riverdale Plating Co.; John Samaras, C. S. Samaras & Son; Joseph Gruzdis, Brookline Electroplaters, Inc.; John Jumer, Electro Glo Company; George Strom, Ada Plating; Phil Ritzenthaler, Plating Engineering Co., West Allis, Wis.; and Charles Jensen, Jensen Plating Works. Seated (left to right) are: Lawrence J. Hay, Plating Service Company; Chet J. Kennedy, American Buffing & Processing Company; Harold W. Baker, Electro Galvanizing Company; Herbert E. DeGrenier, Grand Plating Company; and Austin E. Torney, legal counsel for the Association. Board members not present at time photo was taken are: John Halliday, Great Lakes Plating Co., Div. of Great Lakes Industries; William Blacklidge, Craftsman Plating & Tinning Co.

Dr. Faust Speaks on Protective Metal Coatings

Whenever metal coatings are being considered as protection for an underlying, basis metal at high temperatures, particular attention should be paid to the nature of the interface between the coating and its base. This was one of the points emphasized by Dr. Charles L. Faust, of Battelle Institute, Columbus, Ohio, speaking at a Symposium on Heat Tolerant Metals for Aerodynamic Applications. The symposium was sponsored by the Albuquerque, New Mexico, Chapter of the American Society for Metals.

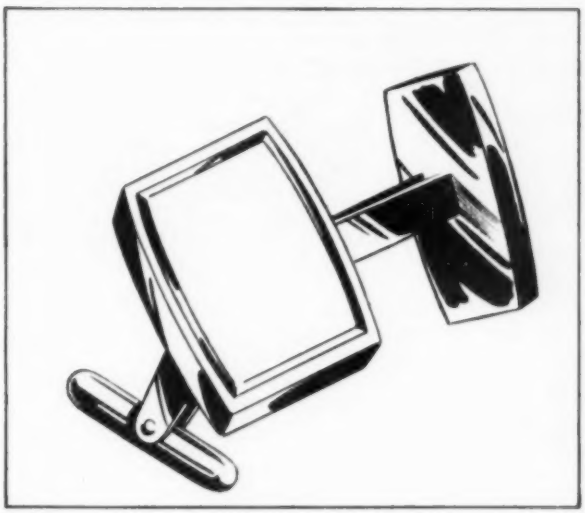
Sound parts composed of a basis metal and protective coating can best be provided, asserts Dr. Faust, when the role of surface metallurgy is taken into account and when the strength and properties of any diffusion alloy formed at the coating-basis interface are known to be satisfactory.

Dr. Faust, who directs electrochemical engineering research at Battelle, reviewed the current status of knowledge on protective metal coatings for use at elevated temperatures. He pointed out that many metals, for example molybdenum, have suitable bulk properties—tensile and creep strength, hardness, etc.—and yet will undergo surface deterioration at the temperatures reached in aerodynamic heating. (Aircraft skin temperatures may reach 600 F at speeds of 2000 mph and possibly 1600 F at 3300 mph.)

The interfacial zone between the basis metal and its protective coating can be responsible for the success or failure of the composite item. Of major importance to adherence of the coating are bond strength between the coating and the basis metal, and the preparation of the basis metal. Preparation includes final physical and chemical cleaning and, also, the last surface finishing operations.

Instances will occur, says the Battelle technologist, in which a coating and a basis metal as individuals have suitable properties but the diffusion alloy formed at the interface between them does not. In these cases, the interposition of a barrier coating with suitable diffusion characteristics can make the composite object usable. For example, chromium and nickel-chromium alloy coatings provide inadequate protection for underlying molybdenum because the "moly" diffuses through the coatings and volatilizes on contact with the oxygen in high temperature air. A chromium-gold-chromium barrier electroplate underneath the final protective coating, notes Dr. Faust, prevents the outward diffusion of the molybdenum.

from cuff links...to automobiles



. . . there's a Wyandotte electrocleaner to meet your plating requirements!

Whatever your electroplating operation — from hand line to full automatic . . . from extremely small items to large and bulky products—you can be sure of economical, efficient results with Wyandotte electrocleaners!

Wyandotte's complete range of electrocleaners are not just thrown together, but evolved from extensive research; have proved themselves effective through use by leading manufacturers.

- **F.S.*** — A superior, heavy-duty reverse-current electrocleaner, noted for exceptional detergency. Features high conductivity, rapid smut removal, controlled foaming, and free rinsing.
- **No. 90** — An excellent, heavy-duty reverse-current electrocleaner, combining exceptional properties of smut removal, chrome tolerance, and controlled foam. It is unique among electrocleaners, in that it also cleans and brightens copper parts, or buffed copper plate.
- **B.N.** — Versatile electrocleaner for direct and reverse cleaning. It is free-rinsing, has high soil tolerance, and is non-dusty. Used by job shops everywhere for all-purpose electrocleaning.
- **LECTRITE-NF** — An inhibited electrocleaner for brass- and zinc-base die castings in automatics or hand lines. Prevents etching, staining, and excessive oxidation during cleaning and in long transfers. It is non-dusty, free flowing.
- **C.S.R.*** — For final reverse-current electrocleaning. Outstanding for smut removal and chrome tolerance.

Your Wyandotte representative is a metal-cleaning specialist, prepared to provide complete technical data on these products and their uses. He will be happy to work with you on production tests as they apply to your operations.

His product knowledge and metal-cleaning experience, backed by the finest research and product development, can help you improve quality and reduce costs! Call him in, today. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, California. Offices in principal cities.*

*Reg. U.S. Pat. Off.

Wyandotte
CHEMICALS
J. B. FORD DIVISION

THE BEST IN CHEMICAL PRODUCTS FOR METAL FINISHING

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 353.

EDITORIAL BOARD HARNESSES CONVENTION EDUCATIONAL SESSION PLANS

Meeting in Montreal, Canada, Friday, January 18, in the Mount Royal Hotel that will be locale of the AES's 44th Annual Convention next June, the Editorial Board painstakingly transacted the large volume of business on its agenda, including the freezing at a maximum 23 the aggregate number of technical papers to be delivered at the six single educational sessions of the coming Montreal convention. John P. Nichols, the Board's chairman, presided.

The Board was presented with 18 abstracts to consider by Philip M. Coady, chairman of the Montreal convention's Educational Sessions. Following discussion of each abstract, these 18 were tentatively approved by the Board and Mr. Coady was authorized to invite the authors to finalize their papers and to provide four copies each for processing, including review, as per established Board policy.

In addition to these eighteen, the Board favorably heard Mr. Coady's description of nine others. Authority was vested in him to invite the completion and review of these nine additional technical papers. Accordingly, the Board, at its meeting of Friday, April 5, 1957 at National Headquarters in Newark will select the final 23 papers from that group of 27 papers authorized for review.

Each reviewing panel of three anonymous experts will include an anonymous member of the Editorial Board assigned at the Montreal meeting. Each of the 27 candidate papers must be completed by authors, received by Mr. Coady and reviewed by April 1 so as to compete at the Board's April 5 meeting. Authors of the four papers not selected for convention delivery will be invited to authorize use of their papers in PLATING magazine.

The titles of the eighteen papers whose abstracts were tentatively approved by the Editorial Board at its January 18 meeting are:

1. Barrel Plating
2. Corrosion and Materials of Construction in the Plating Room
3. Corrosion Resistance of Tin and Tin Alloy Electrodeposits
4. Electrodeposits as Resists in Selective Heat Treating
5. Factors Governing Buff Wear
6. Further Studies of Nickel-Iron Alloy Electrodeposits
7. Future of Plastics in Electroplating Plant
8. Impurities in Chemical Bright Dip Solutions for Aluminum—Their Effect and Removal
9. Influence of the Basis Metal on the Durability of a Watts Nickel Deposit
10. Iridium Plating and Its High Temperature Oxidation Resistance
11. Leveling in Cyanide Copper Baths, A Further Study
12. Nickel Plating on Nickel and Nickel Alloys
13. Plating of High Density, Tungsten-Base, Powdered Metal Alloys
14. Sealing of Anodic Aluminum Oxide Films
15. Study of Application Technique in the Use of Liquid Buffing Compound
16. Study of the Effects of Various Forming Electrolytes on the Anodic Film
17. Surface Catalyzed Reduction of Copper
18. Analytical Methods for Trace Quantities of Cyanide Compounds in the Plating Waste Effluent

Paper Award Appraisal Committee's Report Approved

Among other business at the Montreal meeting, the Board considered the report of its Paper Award Appraisal Committee headed by Past President Arthur W. Logozzo and including Dr. Russel E. Harr and S. Lewis Doughty. Proposing nine annual awards instead of the present six, and advocating changes that are intended to provide even greater incentive and recognition to authors of PLATING and convention papers, the report as approved by the Editorial Board at its Montreal meeting will now be channeled to the Executive Board for its consideration and action at that Board's late-April meeting.

Publishing Specifications for Authors Adopted

Other business consummated by the Editorial Board at its January 18 meeting included the adoption of an author's guide titled, "The AES's Publishing Specifications for Authors." Specifying the Society's publishing policy and procedure and detailing the physical form in which technical papers and their illustrations should be prepared by authors for publishing consideration, the guide was ordered annexed to its Bylaws by the Board. Mr. Coady was instructed to send a copy to each of the 27 candidate authors as an aid to them in the physical preparation of their papers for Board consideration. The Board also ordered broad dissemination of the item among Branches, prospective PLATING authors and others submitting papers for AES publishing appraisal.

Board Recommends Indefinitely Tabling Magazine Name Change

As regards the desirability of modifying the name of PLATING magazine referred to it for study and recommendation by the Executive Board, the Editorial Board unanimously passed a resolution recommending the indefinite tabling of any change in PLATING's name. This concurred with the "sense of the meeting" recommendation adopted at the recent Fourth Interim Meeting of the Supreme Society held in Pittsburgh.

The Board carefully studied the respective ramifications of PLATING's goal and mission. It unanimously agreed as to the objective of "balance" as to content, meaning the accommodation of the readership desires of the widest possible segment of the Society's nearly 7400 members. It favorably appraised the magazine's preplanned coming issues in this light. It was impressed by the growing reservoir of quality technical papers reported by Rodney Leeds, PLATING's editor and Board secretary—recognized the need for unrelaxed maximum effort to maintain, even expand the flow, particularly from AES Branches.

Montreal Convention's Educational Session Accommodations Examined

The Board heard the impressive progress report as to Montreal convention plans delivered by G. Ross Davidson, convention chairman, and enjoyed a tour of convention meeting rooms and other convention accommodations conducted by him.

The June convention will feature single educational sessions unlike dual sessions at last June's Washington convention. These six sessions are scheduled for Monday afternoon, June 17; Tuesday forenoon, afternoon, evening, June 18; Wednesday forenoon, June 19 and Thursday forenoon, June 20.

Present at the Montreal meeting beside Messrs. Nichols, Coady, Davidson and Leeds were Dr. Samuel Heiman, AES president, and Dr. Abner Brenner, John B. Capuano, S. Lewis Doughty, D Russel E. Harr, Arthur W. Logozzo, Howard J. McAleer, Fremont L. Scott and William M. Tucker.

McAleer Heads Board's Nominating Committee

The Nominating Committee named to present a slate of candidates for the Editorial Board for consideration first by that Board itself then reference to the Executive Board includes Howard J. McAleer, chairman, and Dr. Harold J. Wiesner and Robert D. Miller.

The AES Editorial Board in session at the Sheraton-Mount Royal Hotel, Montreal, on January 18. (Left to right) S. Lewis Doughty, Dr. Russell E. Harr, John B. Capuano, William M. Tucker, Dr. Samuel Heiman, Arthur W. Logozzo, John P. Nichols, chairman; Philip M. Coady, Convention Educational Program Chairman; G. Ross Davidson, Convention General Chairman; Howard J. McAleer, Fremont L. Scott, Dr. Abner Brenner.

Plants see quality go up, costs down in chromium plating

Ordinary chromium failed to cover base.

SRHS Chromium covers bottom without burning top, for quality plate.

Control consists merely of quick solution-density reading. Simply adding SRHS Compound restores plating balance, maintains it, assures optimum results.

Improving quality of plating need *not* be accompanied by increasing costs. This has been demonstrated time and again at plants where a Unichrome SRHS® Chromium Solution replaced ordinary chromium. Fact is, the change usually results in a *saving*. Here's why:

CONTRIBUTIONS TO QUALITY

Presuming work has been properly undercoated, quality chromium can be recognized when work emerges from the tank bright, with complete coverage, free from grey or rainbow plate, and free from burns.

Obviously, such quality saves because it minimizes rejects and costly reruns. "SRHS" does this kind of work. With its wider bright plate range, it cuts down misplates. It covers even difficult parts well. Coverage and brightness on stainless steel are exceptional.

OTHER CONTRIBUTIONS TO SAVINGS

Unichrome SRHS Chromium has substantially improved operations. The baths self-regulate important chemical constituents. Automatically maintaining optimum plating balance, they save many hours of chemical analyses and control. Through higher cathode efficiencies, SRHS Chromium reduces power needs. Similarly, it increases tank load size as well as plating speed, thereby delivering more work from existing equipment.

1957 will see a repeat performance of these benefits in many hundreds of plants. Bulletin SRHS-3, available from Metal & Thermit, gives more details.

Copper-tin process simplifies bronze plating

Golden glow M&T Bronze Plating is as easy as depositing a single metal. No dual circuits are used, no "balky" anodes. Copper comes from conventional copper anodes, tin from the stable potassium stannate solution. The deposits build up as a homogeneous alloy.

The result is an extraordinary *golden-glow* bronze finish the image of 24 K gold. It makes an outstanding final finish; or a superior corrosion-resistant undercoat to replace copper and save on nickel. Send for data.

TANTALUM PROTECTS NEW ELECTRIC IMMERSION HEATER

A tantalum sheath encases the heating element in an electric immersion heater developed by Metal & Thermit. This is truly advanced design. It permits direct application of electric heat in all acid solutions except hydrofluoric and fuming sulfuric. This 5000-watt heater is rugged enough for long, continuous primary service.

Tantalum is an acidproof metal comparable to steel in strength. It is available also in Unichrome U-bend and "hair-pin"-bend coils . . . which can be used for both heating and cooling, outlast ordinary coils many times over, cut downtime and costs. Send for more information.

Unichrome is a trademark of Metal & Thermit Corp.

METAL & THERMIT
CORPORATION

General Offices: Rahway, New Jersey
Pittsburgh • Atlanta • Detroit
East Chicago • Los Angeles
In Canada: Metal & Thermit–United Chromium of Canada, Limited, Rexdale, Ont.

A full day's session of the AES's Research Committee held at the Conrad Hilton Hotel, Chicago, Friday, January 25 considered and acted upon many subjects important to the conduct of the Society's Research Program. Committee members above are, left to right, Leslie Diveley; Vice Chairman (Finance) Arthur P. Wrisberg; Leland M. Morse; Chairman Arthur H. Du Rose; Dr. Russel E. Harr; Vice Chairman (Research) Robert A. Ehrhardt and Lloyd O. Gilbert. Also present, but absent when the picture was snapped, were George E. Best and John P. Nichols.

AES NEWS

British Columbia Granted Permanent Charter

By unanimous action of the Society's Executive Board, the British Columbia Branch, temporarily chartered on September 29, 1956 was granted a Permanent Charter effective April 1, 1957. The admittance of this new Branch, therefore, increases the Society's Branch family to 55 located in the United States, Canada and Australia.

It is expected that Dr. Samuel Heiman, the Society's President, will himself present the Permanent Charter to the Branch at a ceremony of installation to be held in Vancouver.

The Society heartily welcomes British Columbia into its Branch roster.

Miami Branch Granted Temporary Charter

The Miami (Florida) Branch is the AES's newest affiliate as a result of action taken by the Executive Board at its Pittsburgh meeting on January 11 granting that Branch a Temporary Charter retroactive to October 1, 1956.

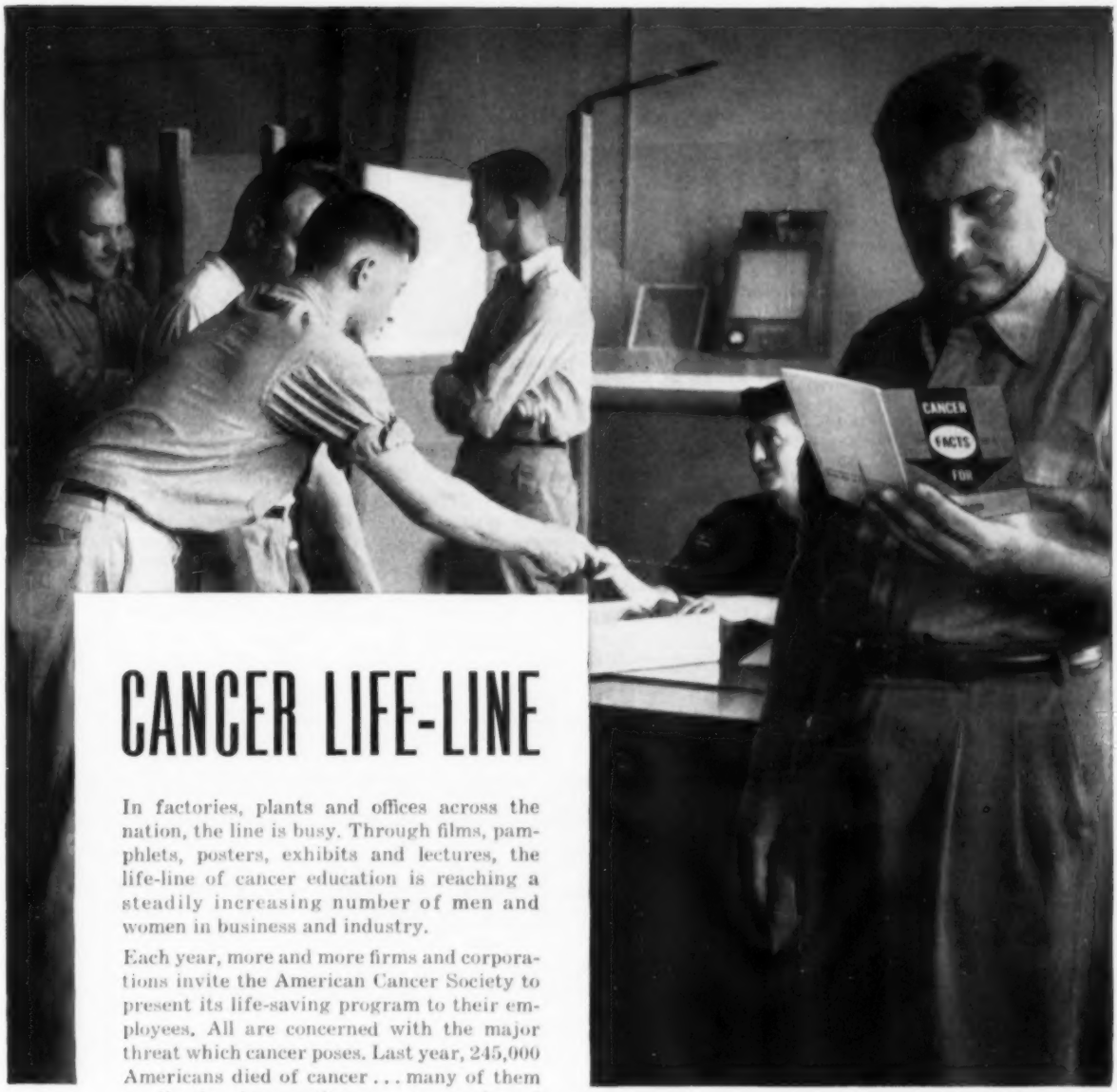
As thus chartered, the Miami Branch numbers 31 members. Its officers include Charles Posner, president; M. H. Dent, first vice president; Ernest Owens, second vice president; A. Newlander, secretary and J. Gibbs, treasurer.

This newest addition, if and when permanently chartered by the Board, would bring the Society's Branch total to 56 located in the United States, Canada and Australia.

Manuel Ben Named Exposition Vice Chairman

To round out effective leadership for the AES's widely anticipated 1959 Detroit Exposition, a climax of the Society's Golden Anniversary observance, the Executive Board recently named Manuel Ben, vice chairman of the Exposition Committee. An executive of the Research Staff of the General Motors Corp., Detroit, Mr. Ben will assist Howard J. McAleer, president, Formax Co., who is the general chairman of the Exposition.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 355.



CANCER LIFE-LINE

In factories, plants and offices across the nation, the line is busy. Through films, pamphlets, posters, exhibits and lectures, the life-line of cancer education is reaching a steadily increasing number of men and women in business and industry.

Each year, more and more firms and corporations invite the American Cancer Society to present its life-saving program to their employees. All are concerned with the major threat which cancer poses. Last year, 245,000 Americans died of cancer . . . many of them needlessly. Among them were experienced executives, key officials, skilled workers. Their loss to business was incalculable. The greater loss, in terms of personal tragedy, was appalling.

Yet, thousands and thousands of them could have been saved *if they had known the importance of going to their doctors in time.* Early detection plus prompt treatment could literally mean the difference between life and death. This, and many other facts of life about cancer, are part of the education program which the American Cancer Society offers you – in your plant or factory. For additional information, call the American Cancer Society office nearest you, or write to "Cancer" in care of your local Post Office.

AMERICAN CANCER SOCIETY

AES NEWS

Sustaining Membership Reports to Branches

The national executive secretary recently announced to Branch Secretaries that, effective February 1, each would receive a copy of the monthly report identifying Sustaining Members added or deleted from the AES's membership rolls. Not only should this report keep Secretaries current as to the status of Sustaining Members but should enable them to assist in encouraging qualified local companies to join and continue as prized Sustaining Members of the AES.

National Officers Traveling Branch Circuit

Four of the six national officers attended the recent excellent Annual Meeting of the Chicago Branch so well conducted by Branch President Russel Harr; Branch Secretary Paul Glab; Educational Chairman Scott Modjeska and other stalwarts of the Midway. These included Second Vice President Herberth E. Head; Third Vice President Ralph D. Wysong; Past President Clyde Kelly and National Executive Secretary John P. Nichols.

The itinerary ahead for the Society's national officers is active. President Samuel Heiman will himself cover the West Coast, including an appearance at the AES's infant Branch in British Columbia at Vancouver.

(Left, usual order) Rudolph J. Hazucha, Award of Merit winner in 1956, looks on as Branch Secretary Paul Glab talks sustaining membership with Walter Oman, Poray, Inc. at Chicago Annual Meeting. (Right) The successful recent annual meeting of the Chicago Branch attracted a banner crowd to the Conrad Hilton Hotel. Stalwarts, left to right, Paul Glab, Branch Secretary; Dr. L. D. McGraw, speaker on "Hydrogen Embrittlement"; R. Scott Modjeska, Educational Chairman; Joseph Andrus, Banquet Chairman; M. J. Hiler, speaker on "Gas Plating" and Dr. Jay H. Monaweck, speaker on "Materials for Reactors."

"Slide Story of AES" Previewed at Pittsburgh

The "Slide Story of the AES" is rapidly nearing completion. In near-finished form, it was recently previewed at the Pittsburgh Interim Meeting as a visual-audio report to that meeting by the national executive secretary. It was shown by him at the recent Southeastern Annual Meeting at Atlanta, and, by invitation, will be taken to other Branches later.

Structure of Society Committee Activated

Acting upon the "sense of the meeting" recommendation of the recent Interim Meeting of the Supreme Society, the Executive Board authorized President

INDUSTRYS LARGEST PRODUCERS OF LIME BUFFING COMPOUNDS

BRAND New SCHAFFNER C-100

LIME BUFFING COMPOUND

recommended for

MIRROR FINISH ON NICKEL AND COPPER

DRY *and* CLEAN WORKING

Request for SAMPLES on your LETTERHEAD will be honored immediately

WRITE - WIRE OR PHONE - TODAY...

"Schaffner Bros. make things shine"
Bob — Paul — Gus

Schaffner

MANUFACTURING COMPANY, INC.

SCHAFFNER CENTER • ROSEWOOD 1-9902 • EMSWORTH, PITTSBURGH 2, PA.

* TRIPOLI COMPOUNDS * CHROME COLORING ROUGE * GREEN ROUGE * JEWELERS' ROUGE * CROCUS COMPOUND * STAINLESS STEEL COMPOUNDS * ALUMINUM BUFFING COMPOUNDS * ALL-PURPOSE BUFFING COMPOUNDS * WHITE COLORING COMPOUNDS * NICKEL BUFFING (LIME) * EMERY CAKE * PLASTIC BUFFING COMPOUNDS * TALLOW GREASE STICK * PUMICE GREASE STOCK * POLISHING WHEEL CEMENT * STEEL POLISHING COMPOUNDS

COMPOUNDS MADE IN BAR, SPRAY OR PASTE

NEW XL* FORMULATIONS...

The most advanced line of formulations developed exclusively for the metal finishing industry.

XL-8 AIR DRY RACK COATING — Builds up heavy coating fast — adheres like no other air dry coating, and does not require baking facilities. Particularly suitable for development of racks for new plating requirements. Provides excellent rack patch over plastisols, as well as protection for general maintenance, such as spillage areas, outsides of tanks and ducts, materials handling components.

XL-12 BAKE-ON PLASTISOL RACK COATING — (Designed for Dip Application) Surface is extra hard to resist damage due to cutting and abrasion. XL-12 is outstanding permanent coating for racks, and materials handling components such as baskets, conveyor hooks, etc. Is resistant to vapor degreasing (including trichlorethylene) and all plating solutions.

XL-33 STRIPPABLE SPRAY BOOTH COATINGS — Designed for fast spray application. Can be quickly stripped off in long continuous sheets. Other formulations in XL-33 series available for temporary metal protection and parts packaging.

XL-77 HEAVY DUTY SPRAYABLE PLASTISOL COATINGS — Series of super-hard-surface vinyl coatings for protection of tanks, ducts, hoods and structures, as well as components, such as impellers, tumbling barrels, handling baskets, etc.

XL-88 STOP-OFF LACQUERS — Provide positive assurance against under-plating, can be applied in heavy films, and can be trimmed cleanly and quickly.

XL-1000 SERIES — COLD-CASTING EPOXIES, especially formulated to cold-cast jig and feature supports to hold work in automatic buffing operations, as well as for pattern and die construction.

XL-2000 SERIES—SUPER-DUTY PROTECTIVE COATINGS—Furnished in air-dry or bake formulations. This series of epoxy coatings provides maximum protection against indoor and outdoor corrosive atmospheres for structures, acid and alkali storage tanks and similar difficult applications.

APPLIED COATING SERVICE: Have your coating work done by experts under controlled conditions. Sheet vinyl, sheet neoprene as well as sprayable and dip plastisol coatings can be applied to your equipment by the GS Plastics Company.

*XL means EXCELL — your assurance of excellence.

— make sure you have the authoritative reports on each of these new formulations which can help you. ASK YOUR LOCAL DISTRIBUTOR OR WRITE DIRECT FOR THE INDIVIDUAL REPORTS YOU WANT.

GS
plastics company

15585 Brookpark Rd.
Cleveland 11, Ohio
Phone: CLearwater 2-4777

AES NEWS

Heiman to appoint a "Structure of the Society" Committee to study the broad framework of the over-all Society and to report and recommend any structural changes needed by the Society to attain its even greater future.

The resultant committee includes Leonard P. Weeg, National Lock Co., chairman; George W. Cavanaugh, General Electric Co.; William Lindsey, Chemical Corp.; Arthur W. Logozzo, Nutmeg Chrome Corp.; William J. Neill, Columbus Metal Products, Inc.; John P. Nichols, American Electroplaters' Society; Cleveland F. Nixon, General Motors Corp.; Arthur G. Pierdon, Art Metal Finishing Co. and Dr. George P. Swift, consultant.

NEW FILMS

Die Casting:
How Else Would
You Make It
and
Zinc Controls Corrosion
(16mm-snd-col)

American Zinc Institute, Inc.
60 East 42nd St.
New York, New York

NATIONAL HEADQUARTERS PERSONNEL

Mrs. Ann Marsh

Office Manager and head of the Membership Division, Mrs. Marsh has one of the longest periods of consecutive AES service among Headquarters' employees.

St. Joseph Valley Sponsors Plating School

Approximately 30 students are enrolled in the plating school started on February 13 by St. Joseph Valley Branch.

Dr. Harold Wiesner, research chemist, Bendix Products Division, Bendix Aviation Corp., South Bend, Ind., and a past president of St. Joseph Valley Branch, has charge of the teaching during the first part of the course. The latter half of this first school term will be under the direction of Dr. Ernest Wilhelm, associate professor of chemical engineering, University of Notre Dame, another past president of the Branch.

Indianapolis Branch Tri-State Regional Host

Arrangements are reported to be completed for the Fourth Annual Tri-State Regional Meeting scheduled to be held at the French Lick-Sheraton Hotel, in the beautiful spa of French Lick, Indiana, on Saturday, March 30.

As published in the February issue, the speakers at this Regional Meeting will be R. O. Hull, Cleveland F. Nixon and Dr. T. J. Bulat. Dr. Samuel Heiman will be unable to attend. Ralph D. Wysong, National Third Vice President, will deliver the opening address for him.

Special entertainment and events have been arranged for the ladies.

ALL PURPOSE CUT AND COLOR
TRIPOLI BUFFING COMPOUND
NON FERROUS METALS

BRAND NEW
Schaffner
TRIPOLI T-300

Write in for your FREE SAMPLE BAR....
Test this NEW compound in your Plant
at OUR EXPENSE....

Request for SAMPLES on your LETTERHEAD
will be honored immediately.

BILT-IN
CLEANING AID

WRITE WIRE OR PHONE TODAY

"Schaffner Bros. make things shine"
Bob — Paul — Gus

Schaffner
MANUFACTURING COMPANY, INC.
SCHAFFNER CENTER • ROSEWOOD 1-9902 • EMSWORTH, PITTSBURGH 2, PA.

* TRIPOLI COMPOUNDS * CHROME COLORING ROUGE * GREEN ROUGE * JEWELERS' ROUGE
* CROCUS COMPOUND * STAINLESS STEEL COMPOUNDS * ALUMINUM BUFFING COMPOUNDS
* ALL-PURPOSE BUFFING COMPOUNDS * WHITE COLORING COMPOUNDS * NICKEL BUFFING (LIME) * EMERY CAKE * PLASTIC BUFFING COMPOUNDS * TALLOW GREASE STICK
* PUMICE GREASE STOCK * POLISHING WHEEL CEMENT * STEEL POLISHING COMPOUNDS

COMPOUNDS MADE IN BAR, SPRAY OR PASTE

Opportunity to Authors to have Papers Appraised

Authors of technical and scientific papers on electroplating, metal finishing and related arts are cordially invited to submit manuscripts of original, unpublished papers to the Editor of PLATING for review and publishing consideration.

Any such paper accepted and published in PLATING will also become eligible, of course, for selection by the Society's PAPER AWARDS COMMITTEE for the Carl E. Heussner Award, George B. Hogaboom Award, AES Bronze Medal Award, Robert S. Leather Award, Chromium Plating Award or the Precious Metal Plating Award.

Though the submission of any such papers by AES members or non-members will be welcomed by PLATING any time during the year, this current period is particularly recommended. So as to expedite review and other processing, please write the Editor, PLATING, 445 Broad Street, Newark 2, New Jersey, for full particulars before submitting your manuscript.

SOUTHLAND'S TOP REGIONAL MEETING HELD IN ATLANTA

Featuring six top speakers and a record audience, the Southeastern Branch's well-planned two-day Second Annual Technical Educational Session auspiciously took place at the Atlanta Biltmore Hotel, in Atlanta, Georgia, February 8–9. As additional fare, the meeting viewed "The Slide Story of the AES." (Left to right, seated) John P. Nichols, National Executive Secretary; Henry Mahlstedt, Metal & Thermit Corp.; George W. Taylor, Southeastern's President and Dr. H. L. Kellner, Lea Mfg. Co. Standing: Richard Fellows, Udylite Corp.; Dr. A. Kenneth Graham of Graham, Crowley & Asso.; Edward Logan, General Arrangements Chairmen; Clinton F. Ivins, Jr., Hanson-Van Winkle-Munning Co. and Henry Strow, True Bright Chemical Prod. Co. Southeastern Territory includes Alabama, Georgia, Mississippi, North Carolina, South Carolina and Tennessee. An outstanding two-day Ladies program was conducted under the aegis of the Ladies' Committee headed by Mrs. George W. Taylor.

AES Membership Report

Total AES Membership January 31, 1957—7406.

ELECTIONS

British Columbia: N. D. Calnan, J. W. Hurford, W. A. Kilby
Buffalo: H. E. Dean, C. G. Johnson, E. M. Jones, R. W. Miller, M. Notery
Chicago: G. Gergits, J. Goutos, R. J. Lamczyk
Columbus: P. E. Davis, A. J. Izzie
Dayton: N. E. Wurster
Detroit: J. E. Bunch, A. Hartung, J. E. Kasper, J. H. Lake, J. T. McWatters, J. W. Taylor, R. E. Verbick
Grand Rapids: R. G. Martin
Hartford: W. J. Cahill, R. A. Hutchinson, J. R. Swienckowski, R. R. Wheeler, Jr.
Indianapolis: T. G. Gross
Los Angeles: B. W. Beeson, V. Hinderer, P. LaBarbara, N. Robinson
Milwaukee: J. G. Bamberger, P. W. Emley, E. L. Koy, R. B. Noble, T. L. Sobczynski, E. P. Waskovich
Newark: W. Hess
Philadelphia: W. Burkette, W. W. Gleadall, J. E. Hawley
Saginaw Valley: M. Baker, R. H. Belt, C. E. Ewing, J. Krato, R. A. Masacek, K. W. Olszewski, J. E. Rosewarne, R. C. Worley
Springfield: L. E. Dupuis, W. Foster, G. R. Martel, J. F. Mitchell, M. P. Roske
Toledo: F. Pingle, J. Vandertill
Toronto: T. A. Dadson, G. A. Lince, A. M. Mulder
Member-at-Large: Ing. Isaac Tiktin R., Mexico, D.F.

REINSTATEMENTS

Buffalo: L. Nowak
Chicago: L. R. Gallas
Detroit: H. Bradley, H. L. Boggus, H. A. Lane, A. H. Lovasz, M. Weinberg
New York: N. Feldman

TRANSFERS

Buffalo: R. Brown from Detroit, R. W. Hess to Newark
Chicago: E. J. Ratterman to Milwaukee
Detroit: A. E. Weber to Pittsburgh
Grand Rapids: R. Lewis to St. Joseph Valley
Hartford: F. W. Hammond from Capitol District
Indianapolis: J. Tharp from Kansas City
Newark: R. W. Hess from Buffalo
Toronto: N. Gregson from Montreal, K. E. McColm from Montreal, M. Spratt from Montreal

RESIGNATIONS

Hamilton: A. J. Wall
Los Angeles: J. M. Bowman
Member-at-Large: W. H. Sawyer, Birmingham, England

SUSPENSIONS

Buffalo: A. M. Fedor, V. G. McDonald, W. C. Rosdahl, R. W. Spencer
Grand Rapids: W. Blumenthal
Hamilton: H. Revill

DEATHS

Buffalo: E. Eastman
Chicago: C. H. McComb
Grand Rapids: J. J. Hanney
Los Angeles: H. B. Bailey

Anode Bags · Baffle Bags
Basket Saver Bags

OF EXCEPTIONAL PURITY AND UTILITY

- ALLIED bags are standard throughout the country, yet are lowest in price.
- Material especially known for strength treated for removal of starches, plastisizers, and leaf.
- Anode bags of cotton nylon, vinyon, orlon, dynel and polyethylene.

ALLIED INDUSTRIES CO. 18400 MT. ELLIOTT AVE. DETROIT 34, MICHIGAN

We make more anode bags than all other makers combined

Zialite
Reg. U. S. Pat. Off.
for NICKEL PLATING
The one bath especially designed for plating DIRECTLY on ZINC, LEAD, ALUMINUM, BRASS, COPPER and IRON.
for HARD CHROMIUM
USE Zialite ADDITION AGENTS
Harder CRACK FREE deposits. Increased throwing power. Less sensitivity to sulfate content. Exceptionally fine results plating anything calling for Decorative or Hard Chrome.
ZIALITE CORPORATION
92 Grove Street Worcester 5, Mass.

H-E-L-P

We need more salesmen and more distributors to help us keep up with the constantly growing demand for the Tramer Copper Core Anode—the first notable forward stride in chrome plating the past five years. Exclusive territory still available to aggressive sales outlets. Write us today, giving full information in first letter.

WORLD'S FINEST ANODE

FOR CHROME PLATING

COPPER *Chemically Bonded*

←CORE *to the Lead*

Quality Sells Them . . Quality Keeps Them Sold!

Every chrome plater is a very live prospect for the Tramer Copper Core Anode because it immediately obsoletes all previous chrome plating anodes. Immediate coverage, excellent throwing power, additional current density, and four to five years of service—in short, the anode sensation in the chrome plating industry.

The GILBERT TRAMER Co.

POLISHING • PLATING and CHEMICAL • EQUIPMENT

1917 MAIN AVE. CLEVELAND 13, OHIO Prospect 1-2751

CLASSIFIED ADVERTISEMENTS

Only "Help Wanted" and "Situations Wanted" will be accepted. Rates: $.20 per word, minimum $5.00. AES branch members and members-at-large only, in good standing, are entitled to a total of three *free* advertisements in any twelve month period as of first insertion. Last day for inserting advertisements is the 10th of month preceding date of publication. When answering advertisements please address as follows: Box number, PLATING, 445 Broad Street, Newark 2, N. J.

EXECUTIVE—27 years industrial cleaning experience catering to metal processing and allied industries. Technical background. Excellent knowledge of formulations, consumer requirements, problems and techniques of selling and servicing industry. Available consultations and/or full time basis. Reply to Box M1, PLATING, 445 Broad St., Newark 2, N. J.

CHEMIST, 38, experienced copper, tin, nickel, cadmium; batteries—seeks position in New Jersey and environments. Reply to Box M2, PLATING, 445 Broad St., Newark 2, N. J.

SITUATION WANTED—Chemist, experienced in copper, nickel, alloy deposits and the precious metals; mainly in research and service work. Prefer New Jersey area location, but will seriously consider re-location for position offering outstanding opportunity. Reply to Box M3, PLATING, 445 Broad St., Newark 2, N. J.

CONSULTANT—11 years of experience in metal finishing, is seeking additional clients. Recent successes on a part time basis stimulated desire to plunge in full time. Reference furnished. Your inquiry will receive prompt attention. Reply to Box M4, PLATING, 445 Broad St., Newark 2, N. Y.

ATTENTION SUPPLIERS: Situation wanted. Is your firm being capably represented in the Kentucky and Southern Indiana area? If not, you should reply to this ad. Chemical engineer, 35 years old, with extensive metal finishing background will do an outstanding sales and service job for you. Reply to Box M5, PLATING, 445 Broad St., Newark 2, N. J.

FOREMAN PLATER—Industrial precious metal plating plant in Los Angeles area has position for working foreman. Must be completely familiar with all phases of silver, gold and rhodium plating, still and barrel tank, be able to handle men, and to take full charge of job and production plating. Salary open. Write experience and qualifications care Box M6, PLATING, 445 Broad St., Newark 2, N. J.

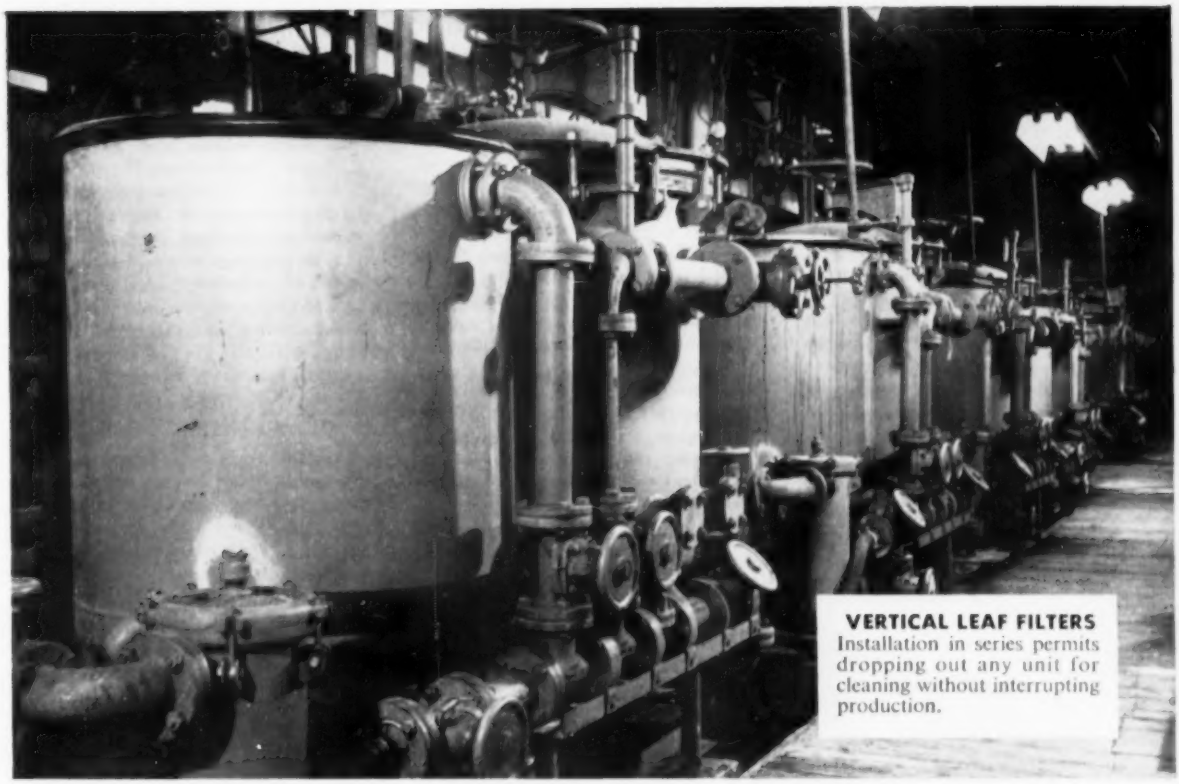
WANTED—Manufacturers agent calling on plating plants in Michigan. One of the leading manufacturers of plating rack coatings and stop-offs seeks an aggressive representative with an established following. Reply to Box M7, PLATING, 445 Broad St., Newark 2, N. J.

SALESMEN—Barrel tumbling compounds and metal cleaning. We are a rapidly growing, long-established, financially solid manufacturer. We need additional experienced salesmen with industrial backgrounds to sell our outstanding quality products. High potential territories, substantial base salary, excellent incentive commission and full expenses. Write in confidence complete background to Box M8, PLATING, 445 Broad St., Newark 2, N. J.

REPRESENTATIVES—Distributors, sales and service representatives, and manufacturers agents wanted by leading eastern chemical manufacturer, to distribute and sell complete line of metal finishing compounds: alkaline cleaners and solvents; plating solutions, additives and finishes; phosphating compounds; paint and metal strippers. Several territories open. Excellent opportunities. Please give complete details. All replies kept in confidence. Reply to Box M9, PLATING, 445 Broad St., Newark 2, N. J.

ATTENTION SALESMEN—If you have been wanting to better your position and work for a progressive, expanding organization, we have openings for six men with sales or plating and polishing experience. Territories involve New York State, Western Penna., Ohio and Indiana. Our organization offers a complete line of supplies and equipment for metal finishing. Replies will be kept confidential. Reply to Box M10, PLATING, 445 Broad St., Newark 2, N. J.

ELECTROFORMING—Exceptional opportunity for experienced man to take charge of department producing spray masks, molds for plastics and specialized heavy plating for industry. Established growing company in mid-west. Give experience, education and remuneration desired in first letter. All replies strictly confidential. T. V. Jay Co., Inc., 2227 W. Belmont Ave., Chicago, Ill. Phone: GRaceland 7-2888.



VERTICAL LEAF FILTERS
Installation in series permits dropping out any unit for cleaning without interrupting production.

Looking for better filtration?

Here are the important points to consider in specifying filters for your plating use

Form should follow function. No one filter design can work efficiently in every plating line. Rapid, thorough (and inexpensive) filtration can only be achieved by filters compatable with the process. Industrial maintains a staff of chemical engineers and chemists who work with you as a team to develop the most suitable form of the following vital factors.

Basic Design: Top, bottom or individual leaf outlets. Each has certain advantages, top outlets have a simplified lockup, controlled from outside the filter shell. Bottom outlets allow a smaller "heel" (fluid left in the chamber at end of filtering cycle) and have a "lift-out" system for attaching leaves to manifold. Individual leaf outlets permit using or shutting off any number of leaves.

Cleaning: Speed and simplified cake disposal keep downtime to a minimum. Industrial makes it possible to clean filters and handle filter cake in any way you wish.

The **air wash system** injects compressed air to agitate the rinse water, allowing repeated washings without opening the filter. **Sluicing devices** direct jets against the leaves for rapid removal of filter cake. **Mechanical shakers** rapidly recover dry material through large bottom outlets or clean-out doors.

Filter Leaf Spacing. This requires a neat balance between theory and practicality, especially where large cake volumes are concerned. The speed with which a filter handles a given volume depends on the leaf area and wide spacing offers a big cake buildup; however, space and cost can limit filter size and the thicker the filter cake, the more power needed to force filtrate through it. Industrial's accumulated data on flow rates for various volumes and viscosities can help decide this tricky problem.

Auxiliary Apparatus. Piping, tanks, pumps and controls should be considered as an integrated system and are best designed and supplied along with the filter. Industrial eliminates the exasperation of buying a unit only to find the piping or pump limits the entire process. One company responsibility is insurance for a fast start and smooth running operation.

Controls. Industrial builds any degree of automation or manual control you need, from a filter that carries out an entire cycle all by itself to one with hand valves at every connection. All types of meters and indicators are available.

Why Industrial can recommend, without partiality, the filter most suitable for your needs. In addition to Vertical Filters, Industrial makes Horizontal Shell, Tubular and Hydra-Shoc Filters. All are adaptable to automation and other conveniences. **For specific information** about your filter problems, write Industrial or see our local representative. We will be glad to make analysis and recommendations.

For full data ask for Bulletin III

INDUSTRIAL

FILTER & PUMP MFG. CO.
5914 OGDEN AVENUE • CHICAGO 50, ILLINOIS

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 362.

BRANCH NEWS

Total AES Branches U. S., Canada, Australia, February 1, 1957—55.

BRITISH COLUMBIA

Members Tour Lock Plant

The fourth meeting of the Branch was held at the Schlage Lock Co. in North Vancouver on Jan. 18, with 28 members and guests present.

President **Bill Marquardt** read an excerpt from PLATING magazine about the election of officers of our branch and a letter from Headquarters of the Society relative to electroplating course available from AES. **J. Stoneberg** moved and **G. Patterson** seconded a motion that our librarian write for further information.

President read a letter from the president of the Society, **Dr. Samuel Heiman,** about his proposed West Coast visit.

J. Lee spoke of the next two general meetings—Feb. 11, the films "Corrosion" from International Nickel and "Motormania" will be shown and on March 29 or 30, a dinner meeting with a paper "Some Plating Problems" will be presented by Dr. Heiman.

Jim Hurford requested information on Society dues.

Jack Stoneberg volunteered a speaker for the May meeting.

The president introduced **Ken Bain,** plant superintendent, through whose good offices, we were able to have a conducted tour through the Schlage Lock plant.

Mr. Bain welcomed the members and guests and gave a short resume of the operation of the plant. He introduced **Pete Short** and **John Robinson** of his staff who gave of their time to make this tour possible. Mr. Bain's talk covered the history of the company mentioning that Walter Schlage introduced the revolutionary "key-in-handle" type of door lock in 1942. Other products in addition to door locks were also touched on.

Following the talk, the party was split into three groups who toured all sections of the plant including raw material storage, rough manufacturing, stamping, polishing, plating, lacquering, assembly and shipping.

BUFFALO

Report Three Meetings

The Buffalo Branch of the AES held its November 1956 meeting at the Moonbrook Country Club, Jamestown, N. Y. The talk given by **Mr. Branciello** was on "CPA 1800—New Chrome Additive."

The Buffalo Branch held its annual Christmas Party on Dec. 7, at the Markeen Hotel, Buffalo. A successful party, with good attendance, was enjoyed.

The January 4, 1957 meeting was held at the Niagara Manor, Eggert Rd. and Niagara Falls Blvd. **G. Tatoian,** spoke on "Polarigraphic Determinations in Electroplating."

Future meetings of the Buffalo Branch will no longer be held at the Hotel Markeen, Buffalo. It is tentatively planned that remaining meetings will be held at the Niagara Manor.

CENTRAL MICHIGAN

Nixon Talks on Nickel Plating Techniques

The Central Michigan Branch of the AES met for dinner and a program at the Hotel Hayes in Jackson, Michigan, on Jan. 8.

The business portion, led by President **G. S. Woodruff,** was primarily a discussion of attendance and membership. The speaker of the evening was **Cleveland F. Nixon,** national past president of the AES, and head of the Electro-Chemistry Department, Research Staff, of the General Motors Corp. Mr. Nixon's subject was "Nickel Conservation," and his talk included a discussion of the newer techniques in nickel plating.

The meeting was concluded with a discussion period and social hour.

Earl D. Creese
Publicity Secretary

CHICAGO

Dr. Meyer Speaks on Stripping Metallic Coatings

The Jan. 11 meeting of the Chicago Branch was designated as Sustaining Members Night. Representatives of our sustaining members were invited as special guests for dinner and the technical session which followed.

clepco
FUSED QUARTZ
IMMERSION HEATERS
FAMOUS THROUGHOUT THE PLATING INDUSTRY
For Quality, Efficiency, Low Cost Operations
OVER 100,000 INSTALLATIONS
For alkaline or acid heating jobs, you can depend on
CLEPCO ELECTRIC IMMERSION HEATERS
CLEPCO STEEL and STAINLESS HEATERS
will meet all your specific needs.
Low Heat Density — Long Life — Vapor-proof junction Box.
See Your Plating Supply House.
SEND FOR COMPLETE INFORMATION
THE CLEVELAND PROCESS COMPANY
1965 EAST 57TH STREET • CLEVELAND 3, OHIO

We were privileged to have as our main speaker, **Dr. Walter Meyer,** eminent scientist and successful businessman. Dr. Meyer received his education in the New Haven, Connecticut schools. His high honors and proficiency in English, chemistry, and mathematics won him a four-year scholarship at Yale University. He graduated magna cum laude with a BS in chemistry from the Sheffield Scientific School of Yale, and earned his PhD in metallurgy from the School of Engineering.

In 1930 Dr. Meyer served as chemist for Sargent and Co., New Haven and gained wide experience in metal finishing. Two years later he went with General Electric Co. in Bridgeport, Connecticut where he served as electrochemist and metallurgist for seven years.

For four years he was editor of two leading plating publications, modernizing and adding greatly to their stature. He later joined Enthone, Inc. and as its president guided it in ten years from a small to a multi-million dollar business with new inventions in the electroplating field.

He is a member of many technical and honorary societies, the recipient of many patents and was awarded the AES Founders Gold Medal.

Dr. Meyer has lectured to chapters of the Electrochemical Society, AES, ASM, AIME, Rotary, Kiwanis, Masons, and to universities.

Dr. Meyer spoke on the stripping of metallic coatings from various base metals. The methods and solutions for stripping all the usual commercial plating were discussed in detail.

J. C. Corre
Publicity Chairman

CINCINNATI
Hear Anodizing Paper; Picnic Date Set

The meeting was called to order on Jan. 23 by President **Roof** at the Engineering Society with 48 members and guests present.

Roger Winterman reported on the Tri-State Meeting, stating that there would not be an Annual Meeting in 1958 because of the National Convention in Cincinnati and that the 1959 Meeting would be held in Louisville. He also reported that he would like to have instructions from the Branch as to whether the St. Joseph Branch should be invited to join the Tri-State Region.

A motion instructing our representative to vote for inviting the St. Joe Branch into the Tri State Region was carried.

Dick Evans reported that he and Roger Winterman have tickets for this year's Tri State Meeting at French Lick, Indiana, on March 30. The tickets are $7.50. The tables will be set for groups of ten.

Will Loveless reported that the Membership Committee would meet after tonight's meeting to map out plans for a membership drive.

President **Roof** reported that the annual picnic will be held June 8 at Kolper's Grove. The picnic committee will be composed of Messrs. Winterman, **Leonhardt** and **Edstrom.**

Helmer Bengston, of the Stolle Corporation, presented a talk on "Anodized Finishes for Aluminum." Mr. Bengston discussed how different types of finishes could be attained by varying the alloy, the electrolyte and the conditions of the anodizing bath. Examples of some of the different finishes were shown. A question and answer period followed.

After a brief recess, **Dr. Frank Lerman,** of the National Distillers Company, gave a very interesting talk on "Creative Thinking." His lecture was supplemented by some very interesting and entertaining slides. Along with the basic principles of this subject, Dr. Lerman pointed out many of the results of the creative thinking process.

The Social Hour which followed the meeting was sponsored by the Osborn Manufacturing Company, **Robert Davidson** acting as host.

D. L. Kaplan
Secretary

COLUMBUS
Neill Tells of Proposals

The regular monthly meeting of the Columbus branch AES was held at Battelle Memorial Institute on Friday, Jan. 4.

The business meeting was called to order by First Vice President **Calvin Smith.**

Two new members were admitted.

Delegate **Bill Neill** talked about four proposals to be presented at the Pittsburgh meeting that: 1. Registration fees at a convention should be split up for different events. 2. The minutes of a meeting should be printed as recorded

For finest copper plating . . . select

ANODES BY TEMCO

The "right" anode can mean the difference between quality plating and mediocre work. Select the most appropriate anode for your particular need.

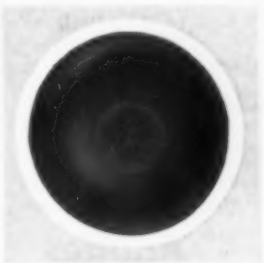
Your goal is quality plating—TEMCO'S contribution to the fulfillment of that goal is quality anodes. There is one anode **most** suited for your individual work. Let's discuss the merits of each—

Cast "Temanode"

The "TEMANODE," also produced in ball form at no extra charge, utilizes mill ends from TEMCO'S own rolling mills. As specialists with 40 years experience casting pure copper we guarantee minimum porosity and recommend this product as most useful for other than hi-speed operations.

Hot Rolled Oval Anode

Elliptical anodes—supplied in specified lengths—are hot rolled and consequently compressed in our mill. With purity guaranteed, this anode highly recommended for quantity production runs when other than basket arrangements are in use.



Forged Ball Anode

To culminate the search for an anode usable in extremely hi-speed operations, the forged ball was developed. The forging rod is specially prepared to withstand cold-working, while hammering assures uniformity of fine grain structure and maximum plating efficiency.

Ask to have our representative or nearest distributor call. For additional information, write direct, stating your requirements.

THE ELECTRIC MATERIALS CO.
NORTH EAST, PENNSYLVANIA

and not altered or deleted. 3. Candidates for national office in AES should be delegates to the convention that have been elected at a regular constituted local branch meeting. 4. The national society should be divided into districts.

Librarian **George Skelly** introduced the speaker of the evening, **Dr. Abe Max** of RCA Victor Division, Indianapolis, Ind., whose subject was "Contributions of Plating to High Fidelity Records." Dr. Max gave an interesting talk on the applications of plating in the manufacture of records.

Following a question and answer session, the meeting was adjourned in favor of coffee and donuts.

Halvor Christianson
Secretary

DAYTON
Interim Meeting Report; French Lick Movie Shown

On January 16, 25 members and friends braved below zero weather to turn out for our regular meeting.

Chairman **Bob Ruleff** gave a very interesting account of his attendance at the Interim Meeting in Pittsburgh.

Fritz Anderson, of the Indianapolis Branch brought us up to date on the details of the Tri-State meeting to be held at French Lick, Ind. on March 30. He also showed a color movie taken at the site.

Dayton Branch member, **Frank Klein,** Rack Processing Co., Dayton was introduced to present his paper "Plating Rack Design." The paper dealt with rack coatings as well as the design of the structural members and contacts. Many excellent slides were shown.

Refreshments after the meeting were also through the courtesy of Rack, represented by **R. A. Coy** and Frank Klein.

R. M. Clinchens
Secretary

GRAND RAPIDS
Welcome New Sustaining Member

The regularly scheduled meeting of the Grand Rapids branch was held at Finger's Restaurant, Jan. 11. President **John Dykstra** opened the meeting by announcing that the plans for the Annual Education Session and Dinner Dance to be held Feb. 16 were complete. He also reported that all of the tickets have been reserved, insuring a full turnout, and carrying on the custom of the past.

John Giere, Udylite Corp., was appointed chairman of the Research and Finance Committee for the remainder of this year. Expert Coatings Co. of Grand Rapids was welcomed as a new sustaining member.

Librarian **Ed Krook** introduced our speaker for the evening, **L. J. Nowacki** of the Organic Coatings Division of the Battelle Development Corp. He spoke on "Paints in Relation to Metal Finishing." Mr. Nowacki pointed out the difference between painting and plating, as well as how certain types of paints and painted finishes were used in conjunction with plating.

Paul A. Waalkes
Publicity Chairman

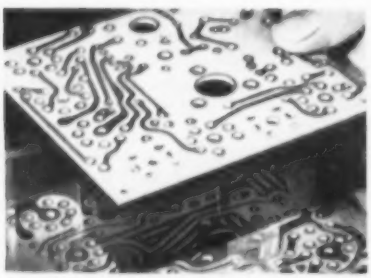
HARTFORD
Illustrated Presentation on Fixture Machining

The regular meeting was held on Jan. 21 at the Bond Hotel, and 99 members and guests were present. Preceding the meeting a movie in color entitled "Metallizing—Its Practical Applications" was shown

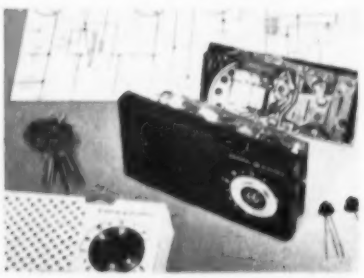
The guest speaker for the evening was **C Heamon Castle** from the Roto-Finish Co. His subject was "Fixture Machining."

With the aid of colored slides Mr. Castle illustrated the before and after treatments in tumbling various parts made of a variety of alloys. Results were shown of the finishes obtained. The slides depicted the equipment used and fixture machining was shown to be the answer to finishing, deburring and descaling of large and of precision parts. The parts are attached to a fixture and moving them through the proper media in a tumbling barrel or special machine, much tedious wheel work or hand filing was eliminated. Mr. Castle spoke briefly on the kinds of media used such as natural stones like granite, limestone, etc. and synthetic abrasive shapes and media of aluminum oxide.

G. E. plates circuits with "Plus-4" Anodes



G-E "Thru-Con" Printed Circuit Boards offer positive connection through the holes without staking pins. Patterns on both sides if needed. Printed circuitry cuts assembly time; cuts product bulk, weight; reduces inspection time.



This transistorized portable radio features a full printed circuit using a General Electric "Thru-Con" Board. Combining other advances in electronics with the printed circuit makes possible sweeping changes in size, weight, and styling.

A new 75-foot automatic acid-copper electroplating tank is the key to the highly mechanized production system in which General Electric will produce some 6,000,000 of its "Thru-Con"—additive-type printed-circuit boards for everything from transistorized portable radios to street light controls.

Plastic strips, with wiring patterns printed in a microscopic layer of silver as a conductive coating for acid-copper plating, run through the tank several thousand at one time, in racks suspended from a conveyor.

The tank holds 850 3½" x 1½" x 42" long oval anodes in three parallel rows. It is filled with a standard 30/7 copper sulfate solution. Current input is 25,000 amps—15,000 amps in series through the outside rows and 10,000 amps through the center row.

General Electric tested several different kinds of anodes—is now using ANACONDA "Plus-4" (Phosphorized Copper) Anodes. These are the comments on their performance:

1. No sludging.
2. Minimum copper build-up in solution. Better than with any other anode tried.
3. Smooth, heavy deposit.
4. There is a greater cathode deposit. Scrap losses are considerably under those anticipated.
5. Throwing power is excellent, producing uniform plating, even inside holes in the plastic strips—for positive electrical connections.

See for yourself how ANACONDA "Plus-4" Anodes can simplify acid-copper electroplating, reduce your costs. Write for information on how you can get a test quantity to supply one tank. Address: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 5614Z

"Plus-4" Anodes
(Phosphorized Copper)
A product of **ANACONDA**®
Made by The American Brass Company
For use under U. S. Patent No. 2,689,216

AES

RESEARCH

$1.00? $100? $40,000?

WHAT FOR?? WHY?? WHAT'S IT ALL ABOUT??

Dear Fellow AES Member:
These questions are good ones, and you're entitled to ask them, particularly now that *you* and every other member *are investing* in our vital Research Program. Briefly, here are the basic answers:

$1—is each **regular member's annual payment** with the new per capita tax increase. This will provide the fund with over $6,000 each year. While the money is needed to help support an active, expanding program, it is perhaps equally important in bringing you into the picture personally, to develop your interest and prompt you to **learn more about the program,** thereby obtaining your **full support** of it.

$100—is the annual cost of a **Sustaining Membership.** We currently have over 350 of them, held by about 300 firms. More are needed. All job shops and manufacturers should be vitally interested in strengthening and building the Electroplating Industry.

$40,000—is the approximate annual budget for the program. Realize that because AES Research is being carried out with much time devoted by members and member firms, and with most work done in college and university labs, that equivalent effort in industry would be up to *five times as costly!*

WATCH—this page for information on AES Research.

GIVE—the Research Program the attention it deserves.

GET—all that you can from it through current and past reports.

ASSIST—your branch Research Chairman in his efforts to obtain additional Sustaining Memberships.

• • •

INVEST NOW!!!

"YOUR BEST BET'S THE AES RESEARCH PROGRAM"

FOR NON-STREAK, FAST CUTTING AND HIGH-LUSTRE FINISHING

CUTS AND COLORS IN ONE OPERATION

CENTERLESS
OPEN BIAS SISAL BUFF

for more keys to GREATER BUFFING OUTPUT

See pages 334, 336, 337

AMERICAN BUFF COMPANY
2414 South LaSalle Street Chicago 16, Illinois

USE READER SERVICE CARD; INDICATE A 366.

DIXRIP
fine wire
SCRATCH BRUSHES
SINCE 1856

Used by Platers, Silversmiths, Jewelry Manufacturers, Makers of Watches, Clocks and Electronics and other metal finishers.

Supplied in straight or crimped brass, steel or nickel silver wire in sizes .0025 to .006
Also available in Stainless Steel, Bristle, Fibre or Nylon
Special sizes and shapes to order.

Write (Dept. E) on your letterhead for catalog and price list.

DIXON & RIPPEL, INC. BOX 116, SAUGERTIES, N. Y.

USE READER SERVICE CARD; INDICATE A 367.

HARRISON & COMPANY
INC.

since 4A 1923

STOP CLEANING WORRIES
with
HARRISON'S NEW EASY
WASH COMPOUND

Complete line of Polishing, Buffing and Deburring Compounds made to wash in Water Solutions, in place of expensive Degreasing Solutions.

Write for Samples
or
Have Representative Call
P. O. Box 457
Haverhill, Massachusetts

USE READER SERVICE CARD; INDICATE A 368.

FOR SALE

Slightly Used BUFFS

Loose and Sewed
Air-Cooled

Any Quantity

MICHIGAN BUFF CO., INC.
3503 GAYLORD AVE. DETROIT (12), MICHIGAN

USE READER SERVICE CARD; INDICATE A 369.

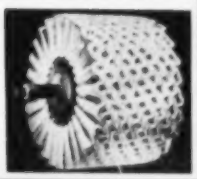
BUFFS *By GUARANTEED For Finer Finishing*

Complete Line of Guaranteed, Quality

BUFFS & POLISHING WHEELS

Straight and 45° "Spoke Buffs"
Patented, Ventilated and Biased

Serving the Finishing Industry for
MORE THAN 50 YEARS



GUARANTEED BUFF CO., Inc.
20 Vandam Street, New York 13, New York

USE READER SERVICE CARD; INDICATE A 370.

For Metal Finishers!

Pressure Moulded NEOPRENE "CAPLUGS"

7 STANDARD SIZES

	A	B	C	D	E	F	G
TO PLUG HOLE SIZE	1/16-3/16	3/16-1/4	1/4-3/16	5/16-1/2	1/2-5/8	9/16-11/16	5/8-3/4
TO CAP STUD SIZE	3/32-5/32	5/32-3/16	3/16-1/4	1/4-5/16	5/16-3/8	3/8-7/16	5/16-1/2

MASKING PROBLEMS OUR SPECIALTY!

WRITE FOR FREE SAMPLE KIT

DUGGAN Masking Devices

2030 WEST FORT STREET
DETROIT 16, MICHIGAN

USE READER SERVICE CARD; INDICATE A 371.

Photo courtesy Kaybar, Inc., Hazel Park, Michigan

what's going on here?

Unichrome Coating 218X, of course!

EVERY USER *knows* that in coatings for racks and screens, there's never any question of quality with Unichrome Coating 218X. This vinyl plastisol endures all plating and cleaning cycles, does not contaminate sensitive baths, survives long hard use without damage. Users know too, that through its extended service life and reduced maintenance, they're getting lowest costs.

If you don't want to apply it yourself, nearby, experienced, skillful specialists can apply Coating 218X for you. Ask us for names.

UNICHROME 7-3

METAL & THERMIT CORPORATION

GENERAL OFFICES: RAHWAY, NEW JERSEY

Atlanta • Pittsburgh • Detroit • E. Chicago • Los Angeles

In Canada: Metal & Thermit-United Chromium of Canada, Limited, Rexdale, Ont.

The technical chairman for the evening was **Andrew Palm.**

Stanley Platoz
Secretary

INDIANAPOLIS

Tri-State Meeting Plans Reported

On Jan. 2, **Marshal Whitehurst** called the Indianapolis meeting to order at the regular place. Thirty-one members and guests were present.

Fritz Anderson reported that Tri-State committees were progressing and that they would have another meeting Jan. 5. **Les Reynolds** reported that Cincinnati branch is backing all of the Tri-State endeavors and of course would like similar cooperation. Tickets have been printed and are turned over to **Bert Hawbee.** PLATING and *Product Finishing* magazines are lending space to announce the March 30 meeting. Three complete mailings are also going out to boost the meeting.

The president reminded all of those who have received information requests to please fill them out and return them to the Home Office.

Loren Stevens introduced the color movie "Mining for Nickel" by the courtesy of International Nickel Corp. as the educational feature for the evening.

The movie gives a good idea of the extensive work of exploring, test drilling, sinking shafts through solid rock, mining, and replacing countless tons of rock, just to obtain sufficient nickel to supply the increasing demand.

One application for membership was received.

The meeting adjourned 9:25 P.M.

Paul Freeman
Secretary

LOS ANGELES

1960 Convention Committees Already Being Formed

The January meeting was held on the 9th at Rodger Young Auditorium, with an attendance figure of 54 members and guests. **Gene Chapdelaine,** of the Hartford Branch, was introduced to the membership. After President **Truman Stoner** opened the meeting and conducted the preliminary business, four members were initiated into the branch. Some of the business items brought up during the meeting, were: (1) The appointment of **Larry Henderson** as Hotel and Reservation Chairman for the 1960 Convention by Convention Chairman **Tony Stabile.** (2) The request for volunteers to take over various chairmanships and committees for the 1960 convention by **George Hetz,** co-chairman. (3) A report by **Harvey Hunt** on the progress of the March 23 Annual Educational Program, along with reports from his committeemen. (4) The announcement by the president of the next meeting to be known as "Charter Members' Night," officiated by **Earl Coffin,** one of the original charter members.

A report of the death on Dec. 31 of **Harry B. Bailey,** an original and constantly active charter member, was given by **Don Bedwell.** He recounted briefly Mr. Bailey's activities.

In lieu of the regularly scheduled technical session, the evening's technical program was devoted to honoring the local Sustaining Members and their representatives. This session was conducted by our librarian, **Emmett Babcock,** and our research committee chairman, **Kenneth C. Johnson.** The topic of their discussion was: "How Your Research Dollars are Spent," which covered the research committee's background and history, some of its current projects, and what the sustaining dollars buy.

Among the local sustaining members and their representatives in attendance for this meeting, were:

Alert Supply Co., Harvey Hunt; Associated Plating Co., Tony Stabile; L. H. Butcher Co., Ben Tarver; Crown City Plating Co., Robert Coombs; Hall-Mack Co., Don Bedwell; Kelite Products, Gene Peters; Mefford Chemical Co., George Hetz; Milborn Supply Co., John Milborn; Modern Plating Co., Oscar Gust; North American Aviation, Inc., Stanley Kritzer; Price-Pfister Brass Mfg. Co., Paul Franke; Sundmark Supply Co., Roger Sundmark; Surface Alloys Co., Charles King; Virtue Bros. Mfg. Co., Ed Longfield.

Other sustaining members that were honored, but had no representatives present, were:

Barber Webb Co., George E. Nichols Plating Co., Rheem Automotive, Standard Nickel Chromium Plating Co., Turco Products, Wildberg Bros. Smelting & Refining Co.

The president appointed **Earl Arnold, Stuart Krentel** and **Ed Wells** as the Nominating Committee to select new officers and delegates for April.

Frank Virgil
Secretary

Photo courtesy: Hanson-Van Winkle-Munning Co.

Tests Prove These Linings Can't Be Separated!

Manhattan engineers have developed a method of bonding metal to rubber so securely that actual mechanical pull tests prove it can't be separated. Thick, multiple calendered sheets of natural or synthetic rubber are inseparably bonded by Manhattan lining specialists to assure you permanent protection against the corrosion and abrasion of your equipment or contamination of process solutions. They eliminate the dangers of stray currents in plating operations . . . won't harden or crack . . . even under extreme temperature changes.

Whether your plating equipment is large or small, intricate or simple . . . Manhattan has the facilities to efficiently handle your rubber lining needs. To make certain your lining is flawless and permanent, every piece of equipment lined by Manhattan is tested under high voltage to detect any possible defects. Many Manhattan Rubber Lined plating tanks have been in continuous use for over thirty years!

Make certain you have permanent protection against corrosion, contamination and abrasion in your costly plating operations. Let the R/M lining engineer at the plant nearest you show you how you can get "More Use per Dollar" with an investment in Manhattan Rubber Linings.

RM 524

RUBBER LINING PLANTS AT PASSAIC, N. J. • NORTH CHARLESTON, S. C.

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose Fan Belts • Brake Linings & Blocks • Clutch Facings • Packings • Asbestos Textiles Engineered Plastic, and Sintered Metal Products • Abrasive & Diamond Wheels • Bowling Balls

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 373.

MILWAUKEE

Six New Members; Both Divisions Hear Speakers

The 475th regular meeting of the Milwaukee Branch was called to order by President **Herman Tessman** on Jan. 4, at 8:15 p.m. at the Ambassador Hotel. There were approximately 70 members present.

Six men were presented and elected to membership.

The president appointed a nominating committee consisting of: **Henry Bornitzke,** Chairman; **Clifford Peter, Glen Schwemmer, John Wagner.**

The nominating committee was instructed to notify the membership of candidates for office by the March meeting.

A letter from the Chicago Branch was read, inviting the membership to their Annual Meeting at the Conrad Hilton Hotel on Jan. 26.

Leslie Diveley was requested to inform the membership of the request of the Mississippi Valley Branch to support their candidate, **Lloyd Gilbert,** for national third vice president. It will be considered at a future date.

The chair called for discussion on the new organic division. **Mr. Bamberger** indicated that it fulfilled a need and that there now seemed to be a "watch and see" attitude. He also stated that he was learning about his own business from other members. **Mr. Wagner** stated that we have an excellent beginning and we must work hard to follow up and deliver the final push.

The president relinquished the floor to the Educational Director, Leslie Diveley, who offered some timely remarks climaxed with the reminder that the Society was primarily a mutual educational Society and the membership benefits from it in direct proportion to the efforts it puts into it.

The speakers for the evening were **E. H. McCoy,** owner of Electrochemical Products Co., who delivered a paper on "Bright Copper Plating" to the inorganic section; and **Stuart K. Golding,** chief research chemist for the J. L. Clark Co. He presented a paper on "Finishing And Decorating Metal Containers" to the organic division.

S. Taterzynski
Secretary-Treasurer

NEW HAVEN

Carlson Presents Paper on Fluoborate Solutions

The regular January meeting was called to order at 8:30 p.m. by president, **Austin Jackson.**

The report on the very successful Christmas Party was given by **E. Busby,** chairman of the entertainment committee.

President Jackson gave the report of the last Regional Committee meeting held at the Statler Hotel, Hartford, Conn. The budget was set at this meeting for the 18th Annual Regional to be held on April 27, 1957.

Springfield is the Host Branch for the Regional Meeting; Hartford will handle the Educational Program; Waterbury, Entertainment; Bridgeport, the Program, and New Haven will take care of Publicity.

The technical chairman, **Harry Taylor,** introduced the speaker of the evening, **A. E. Carlson,** technical service, General Chemical Division of Allied Chemical & Dye Corp. Mr. Carlson spoke on "Plating from Fluoborate Solutions." This was a very interesting and educational talk, followed by a question and answer period.

The door prize was donated by **Bill Bridgett,** Hanson-Van Winkle-Munning Co.

B. Gaffney
Secretary-Treasurer

NEW YORK

Charles Schlott Receives Honorary Membership Pin

The meeting was called to order by President **D. Hartshorn Jr.** One application for membership was submitted. Two new members were accepted.

Dr. Ed Saubestre, reporting for the banquet committee stated that all arrangements are progressing nicely. The dinner, entertainment, etc., have been provided and many ads for the journal have already been received. Tickets to the banquet are expected to be circulated on or about Jan. 15.

On behalf of the Branch, **F. J. Mac Stoker** presented an Honorary Membership pin to **Charles Schlott.** Charlie is an old timer in the branch and has untiringly given of his time and energy to many of its functions.

Librarian **Joe Rembecki** introduced the popular **Lou Dunroe** of Newark,

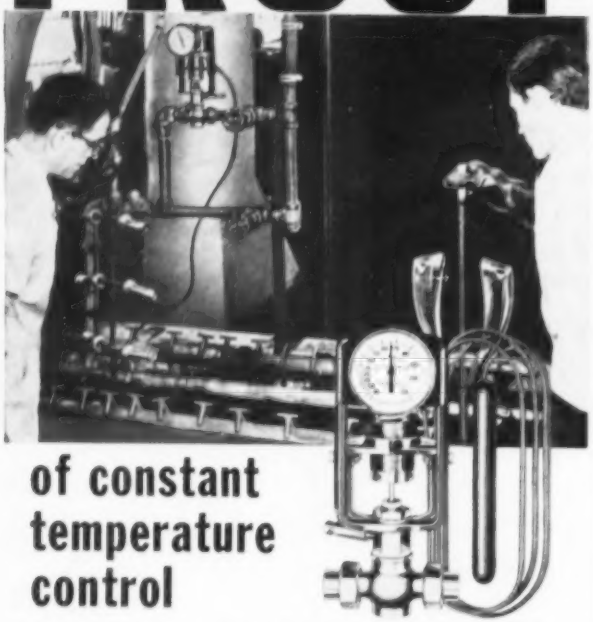
6500 E. ROBINWOOD
DETROIT 34, MICHIGAN

Phone —TWinbrook 3-0800

Other Divisions: Wolverine Steel Sales Co., Korman Barrel and Bag Co.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 374.

VISIBLE PROOF



of constant temperature control

for high quality, high profit plating

Simple, compact, and dependable, the Powers No. 11-MF Self-Operating Temperature Regulator assures quality finishes with a minimum of waste. With accurate control of temperatures, your processes can be operated at their most efficient level without danger of costly overheating. Being self-operated, the No. 11-MF requires no external power source.

Easy-to-read four inch dial thermometer provides a fast means of checking controlled temperatures. The plastic covered bulb and tubing assures long life in the various solutions encountered in plating processes. The big double ply metal bellows gives extra valve power and the valve stem lubricator insures complete freedom from binding. Available in several temperature ranges, there's a Powers No. 11-MF Regulator to fit your particular requirements.

THE POWERS REGULATOR COMPANY
Skokie 30, Ill., Dept. 357

For specifications, valve, types, and temperature ranges, call your Powers branch office – engineering services in over 60 cities. Write for Bulletin 330.

POWERS

TEMPERATURE CONTROL

USE READER SERVICE CARD; INDICATE A 375.

FILTRATION UNDER DIFFICULT CONDITIONS

acid copper sulphate bright nickel

fluoborates precious metals

electroless nickel and other critical solutions

write for FOLDER

Sethco FILTER PUMP UNITS

Self-Priming. Automatic Back-Washing

Models equipped with corrosive resistant alloys and materials for every electroplating and industrial solution from pH 0 to pH 14. Also available: all plastic filter pump with no metal contacts. Removes particles down to one micron in size.

Model LSIN series full view Lucite Filter chamber self-priming SS-316 pump Cap. 50-350 Gal. per hr.

over **25 models** designed to fit your needs from 50-3,000 Gal. per hr.

Sethco Mfg. Co., 72 Willoughby St., Bklyn., N. Y. • ULster 5-8940

USE READER SERVICE CARD; INDICATE A 376.

ZINC PLATERS:

FOR QUALITY PERFORMANCE AT LOWEST COST, purify cyanide zinc plating solutions with

McKeon's Zinc-Brite

Regular use keeps zinc solutions constantly clear. Eliminates need for ANY OTHER purifying treatment. Brightens work.

Write-Phone-Wire Collect

Sulphur Products Co. Inc.

621 West Pittsburgh St.
Greensburg, Pa.

USE READER SERVICE CARD; INDICATE A 377.

N. J. Lou supervised the "Questions and Answers" program which he had so successfully presented the year previous. Lou was a tremendous hit again this year and many of us are looking forward to having him again in 1957. Lou was given a rising vote of thanks for his wonderful effort, the meeting was adjourned and everyone retired to the refreshment buffet.

Anthony P. Briganti
Recording Secretary

NEWARK
Myron Diggin and Jack Finn Speak at Well-Attended Meeting

The Jan. 18 meeting of the Newark Branch was held at the Robert Treat Hotel with vice President **Bittrich** as chairman. Three applications were received. A new member was elected and a transfer received.

D. Foulke reported on the Interim meeting held on Jan. 12 at Pittsburgh which was attended by the three Newark Branch delegates, Messrs. **Cobb, Wagner** and Foulke, and at which Newark Branch member **Dr. Andrew W. Wesley** was proposed as a candidate for third vice president of the Society.

Edward Faint was present after an illness and thanked the membership for their interest. **Royal Clarke** was reported recuperating at his home.

In the absence of Librarian **Carr, Cy LaManna** substituted, introducing first, **Jack Finn** of Sel-Rex who discussed the maintenance and care of filter pumps. He pointed out the care required for pumps with mechanical or with jam type packing. The first must not be run dry and the second must leak a trifle to be effective.

Myron B. Diggin, Hanson-Van Winkle-Munning Co., then delivered the principal talk of the evening, "Some Recent Developments in Nickel Plating." He reviewed the improvements in physical properties of bright nickel deposits in recent years and pointed out that plating speeds had also increased. Corrosion resistance and leveling ability of bright electrodeposited nickel are of more and more importance to the industry. Mr. Diggin showed how good physical properties and improved corrosion resistance could be obtained by use of duplex (80 per cent semi-bright leveling nickel plus 20 per cent bright nickel) coatings applied in either a one-bath or two-bath set-up.

A number of slides showing deposit structure and type of corrosion were shown. The many questions and comments from the audience of 65 who braved near-zero weather, pointed up the excellence of the talk.

D. Gardner Foulke
Secretary

PHILADELPHIA
Dr. Heiman Presents Electroplating Class

The regular meeting was held at the Engineers' Club with 44 at dinner and about 65 at the meeting. The new Honorary Member of the Branch, Past AES President **Frederick Fulforth,** was introduced. He expressed his appreciation and announced he would be soon moving South due to territory changes. Three new members were admitted; four applications were received.

After hearing a report from **James Cogan** on hotel proposals for the 1957 Annual Educational Session and Banquet, a motion was adopted selecting the new Sheraton Hotel for November 2. The secretary spoke on the importance of returning Audit Bureau of Circulations cards to the National Office. He also announced two employment items. **Robert Elliot** gave a resumé of activities scheduled for Engineers' Week in Philadelphia, complete details to appear in the Delaware Valley Announcer.

Reports of the Interim Meeting of January 12 were given by Alternate Delegates Cogan and **Farren,** with some discussion following. A motion was made by the secretary and passed that a Branch committee be appointed to investigate the possibility of the Philadelphia Branch establishing an organic finishing section.

The electroplating class taught by **Dr. Heiman** was presented by him to the meeting. Since it was the last class meeting of the term, the class members were introduced individually. Dr. Heiman expressed his appreciation to the four Philadelphia Branch members who lectured to the class on the days he was absent attending his duties as AES president.

Mr. Trusdell appointed the Nominating Committee for the 1957-58 term;

You can have
PERFECTION
in **PROTECTION . . .**

No two products require the same *degree* of protection. *Your* product may need a finish *custom-formulated* to provide sufficient protection against corrosion, abrasion or other enemies.

Stanley Technicians formulate vinyl dispersions (*both* Plastisols and Organosols) for many of America's best known and best-protected products. They will tell you if a standard Stanley Plastisol or Organosol System will suffice . . . or they will *custom-formulate* a coating to assure *perfection* in *protection.*

Write for our free file folder, "PLASTISOLutions To Your Finishing Problems," to . . .

STANLEY CHEMICAL COMPANY*
Subsidiary of The Stanley Works
DEPT. C, 1508 BERLIN STREET, EAST BERLIN, CONN.
**Member, Vinyl Dispersions Division, S.P.I.*

STANLEY

See Stanley first for finishes that last
LACQUERS • SYNTHETICS
VINYLS • ENAMELS

STANLEY TOOLS • STANLEY HARDWARE • STANLEY ELECTRIC TOOLS

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 3/8.

SUPER-MARKET FOR ANODES

BUY DIRECT FROM METAL CONVERTER!

Nickel anodes up to 93 inches in length . . . of the highest purity. Density of anodes is at a maximum. Longer life in plating bath.

NICKEL RECASTING PRICE SCHEDULE

ANY QUANTITY only 99 + purity accepted

15c PER POUND FOB UNIVERTICAL

Laboratory Controlled

Write or wire for best price and delivery on the following anodes:

Copper-Electro Deposited	Phos. Copper
Copper-Cast Round 3" Dia.	White Brass
Copper-Cast Round 2½" Dia.	Zinc
Copper-Cast Beehives	Tin
Copper-Cast Balls	Lead
Copper-Forged Balls	Carbon
Copper-Rolled Oval 1½" x 3"	

UNIVERTICAL Since 1939

FOUNDRY AND MACHINE COMPANY

14841 Meyers Rd. BRoadway 3-2000 Detroit 27, Michigan

USE READER SERVICE CARD; INDICATE A 379.

BUYERS OF NICKEL ANODES AND CATHODES

Also

NICKEL AND NICKEL BEARING SCRAP IN ALL FORMS

MAILED-IN SAMPLES RECEIVE PROMPT REPLY

WILLIAM ROSENTHAL & COMPANY

337 Jelliff Avenue, Newark, New Jersey Bigelow 3-3232

USE READER SERVICE CARD; INDICATE A 381.

PROMAT

PROGLO 100
A full bright cyanide zinc addition agent in powder form for barrel, still, semi, and full automatic plating solutions.

In the interests of your economy and better product results, let us prove to you what PROGLO 100 will do for you. For free technical information, write us today.

PROMAT A DIVISION OF **POOR & CO.**

851 S. MARKET STREET · WAUKEGAN, ILLINOIS

"PROMAT MEANS PROTECTIVE MATERIALS"

USE READER SERVICE CARD; INDICATE A 382.

Producers

NICKEL ANODES

Cast and Rolled
All Lengths

Prompt Delivery

SABIN METAL CORPORATION

310 Meserole St.
Brooklyn 6, N. Y.
EVergreen 1-5000

USE READER SERVICE CARD; INDICATE A 380.

SEELEY Buffing Compounds

Way Ahead for Fine Product Finishing

Bar—Liquid—Greaseless

E. E. SEELEY COMPANY INC.

Bridgeport 1, Conn.

USE READER SERVICE CARD; INDICATE A 383.

George M. Long, chairman, **Clarence E. Boerckel** and **Eugene J. Zurbach Jr.**

The speaker was **Donald J. Wahler,** Maplewood Companies, whose topic was "Automatic Polishing and Buffing." He stated the mechanization of buffing had not kept pace with other mechanical operations, with the major portion of buffing still being done by hand. He claimed 95 per cent of automatic machines are flexible enough to permit their use on a variety of parts. Output may vary from 300 to 22,000 pieces per hour. Costs of buffs and compounds are considerably lower than generally realized. Unskilled labor may be used to operate the automatic machines. Slides showed the various types of machines and their versatility.

I. Wm. Marcovitch
Secretary

PROVIDENCE-ATTLEBORO

Hear Report of Interim Meeting; Goldman Speaks

The Providence-Attleboro Branch held its regular monthly meeting at the Engineering Society Building, 195 Angell St., Providence, R. I., Monday, Jan. 21.

President **Sibley Kershaw** called the meeting to order at 8:15 p.m. and announced that the Christmas Party held December 10, at the Wayland Manor was very successful. He thanked all who had supplied prizes.

President Kershaw introduced **Pierre Lonsberry** who gave a comprehensive report on the Interim Meeting at Pittsburgh, Jan. 12, 1957. Points of interest were a permanent committee set-up for both education and membership; the expansion of interest into the organic finishing field; the physical condition of the National Society; and the publishing of text books and monographs. Mr. Lonsberry also suggested the possibility of the Providence-Attleboro Branch sponsoring an Interim Meeting at some time in the future.

President Kershaw announced that **Arthur Wood** is convalescing nicely from his recent accident. He stated that Mr. Wood, one of the oldest members of the Branch, misses the opportunity of attending the meetings.

John Cahill, librarian, introduced **Hubert Goldman** of Enthone Inc. Mr. Goldman gave an extremely interesting talk entitled "Preparation of Metal Surfaces for Electroplating."

He illustrated his talk with unique slides showing different conditions of metal surfaces commonly electroplated. Points discussed were types of soils, conditions of the metal surfaces, and various cleaning and activating treatments that could be used.

Mr. Goldman was given a rising vote of thanks after a question and answer period.

F. L. Sherman
Secretary

ROCHESTER

Tour Consolidated Electrodynamics Plant

The Rochester Branch met on Monday, Jan. 21, at 8:00 p.m. in the cafeteria of the Consolidated Electrodynamics Corp., Rochester, N. Y.

The meeting was called to order by the president, **Fred Thiem.** The meeting was turned over to the representatives of Consolidated Electrodynamics who gave a very interesting discussion on vacuum metallizing, illustrated by color slides. After the discussion, a plant tour was made with a demonstration of vacuum metallizing carried on during the trip through the plant.

Linwood P. Morrison
Secretary-Treasurer

ROCKFORD

Fine Ladies Night Meeting

The regular monthly meeting of the Rockford Branch was held Monday evening Jan. 14 in the Winnebago Room of the Faust Hotel and was devoted specifically to the ladies.

A very short business meeting followed a delicious dinner, served to 69 members and guests.

A report on the Interim meeting which was held in Pittsburgh was given by **Leonard Weeg.** He briefly outlined the coming plans for the National Society. **Mr. Geissman,** our capable president, appointed a Nominating Committee for the 1957 election of officers, composed of **Le Roy Johnson, Vern Wissen,** and **Albert Overbey.**

The meeting was turned over to **Bob Twyning,** librarian, who introduced **Gerry Lux,** technical director of Oakite Products Inc., who presented a very timely paper entitled "Detergency," and what ladies should look for in a detergent. His presentation on this subject drew un-

A BETTER BACK-UP WHEEL

R57

FOR YOUR ABRASIVE BELTS

"X" Serration used for moderate contour work

AVAILABLE NOW IN POPULAR 14" DIAMETER SIZES AT BIG SAVINGS

You can get the new R57 RUBBER CONTACT WHEELS at lower prices in 14" Diameter sizes***due to newly developed production techniques. These new wheels have all the well-known features of the R50 and R54 models—LONGER BELT LIFE . . . OIL RESISTANT RUBBER . . . WET OR DRY OPERATION . . . HEAT DISSIPATION . . . MAXIMUM SAFETY . . . other features. And what's more these wheels have a 30% trade-in value.

***The new R57 and the R50 and R54 contact wheels are available in many popular sizes . . . ½" to 22" DIAMETERS in WIDTHS from 1" to 6". Other wheels made to your specifications in all widths and diameters.

14"

TYPE	WIDTH OF FACE 1"	2"	3"	4"
PLAIN	32.00	34.00	36.00	38.00
SERRATED	37.00	39.00	42.00	44.00

A WHEEL FOR EVERY OPERATION

AVAILABLE IN PLAIN OR SERRATED FACE IN ALL DUROMETERS

45° Scoop Tooth — Aggressive Stock Removal
Slit Serration — Aggressive Contact Work
Cosmo Expander — Operates without back-stand idler
45° Standard — Stock Removal

WRITE FOR DETAILS

DElta 6-8900

CHICAGO RUBBER COMPANY, INC.
651 MARKET STREET • WAUKEGAN, ILLINOIS

Specializing in Contact Wheels and Industrial and Printers Rolls

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 384.

FOR FAST, HARD CUTTING ON IRREGULAR SURFACES
of stainless steel • carbon steel • aluminum

CENTERLESS (SEWED)
UNIT CLOTH BUFF

for more keys to GREATER BUFFING OUTPUT

See pages 326, 336, 337

AMERICAN BUFF COMPANY
2414 South LaSalle Street Chicago 16, Illinois

USE READER SERVICE CARD; INDICATE A 385.

Memo from A Pleased Plater

Dear Jim: Believe it or not Peterson the plant chemist, and I, are talking the same language—we're pals! Couldn't get it at first until I checked the grapevine and found the boss had written the JOSEPH B. KUSHNER ELECTRO-PLATING SCHOOL (in Stroudsburg, Pa.,) and enrolled "Pesty" too! The boss is sure a shrewd cooky—production's smoother than ice cream now! Your pal, Bill.

USE READER SERVICE CARD; INDICATE A 388.

BEAM-KNODEL CO.

Distributors for

HANSON-VAN WINKLE-MUNNING CO.'S

"PLATEMANSHIP"

A Complete Service for

ELECTROPLATING
POLISHING AND BUFFING
CLEANING AND ANODIZING

CA 6-3956-7 • 195 Lafayette Street, New York 12, N. Y.

USE READER SERVICE CARD; INDICATE A 386.

FOR SALE
MOTOR GENERATOR

One Chandeysson Generator—Direct Current—Motor Driven: *Exciter*—Type CX12.5, KW 5, RPM 300, Volts 125, Full Load Amp 40, Time Rating Cont., Winding Comp., Temp. Rise Normal 40° C. *Generator*—Type SP46, KW 60, RPM 300, Volts 6, Full Load Amp 10,000, Time Rating Cont., Winding Shunt, Temp. Rise Normal 40° C. *Synchronous Motor*—Type SA42, HP 100, RPM 300, PF 8, Volts 440, Amp Full Load 139, Phase 3, Cycles 60, Amp Field 17, Volts Field 125, Temp. Rise Normal 40° C, Time Rating Cont. Serial Nos. 36202, 36200 and 36201.

(New—October, 1955)

GRAND RAPIDS METALCRAFT

Phone: Glendale 6-7101 GRAND RAPIDS, MICHIGAN

USE READER SERVICE CARD; INDICATE A 389.

DIESEL

Catering to metal finishers needs!

ANODES *(all forms and sizes)*

Nickel, Zinc, Tin, Brass, Cadmium, Copper, Silver, Lead-Antimony, For Chrome.

PLATING CHEMICALS

Nickel Sulphate, Nickel Chloride Imported, Nickel Carbonate, Nickel Acetate, Potassium Cyanide, Copper Cyanide, Zinc Cyanide, Sodium Cyanide Eggs, Cobalt Sulphate, Cadmium Oxide, Trichlorethylene—Stabilized, Perchlorethylene, Caustic Soda, Caustic Potash, All Acids, Zinc Salts No. 1, reasonable.

NEW AND USED EQUIPMENT

Prompt Deliveries—Complete Stock at all times

WE PURCHASE SCRAP METALS

DIESEL
CHEMICAL
COMPANY

578P Carroll St., Brooklyn 15, N. Y.
MAin 2-0703-4

"A trial will convince you"

MEMBER
Chemical Finishing Suppliers Association Inc.

USE READER SERVICE CARD; INDICATE A 387.

CALCINED ALUMINA
FUSED ALUMINA
NEPHELINE SYENITE

Many Great Lakes products are playing an important part in the metal finishing and plating industries.

Write us for information how Great Lakes abrasive raw materials may solve your problem.

Great Lakes
FOUNDRY SAND COMPANY – DETROIT
CERAMIC DIVISION
HIGH ALUMINA CONTENT • IDEAL FLUXING PROPERTIES

USE READER SERVICE CARD; INDICATE A 390.

limited discussion by both the men and ladies present. This proved to be one of the finest meetings ever held by this branch both from an attendance and educational standpoint. Much praise goes to Mr. Lux and to Oakite products Company for their fine cooperation.

E. J. Budden
Secretary-Treasurer

SAGINAW VALLEY

Plant Tour Ends in Snow Storm

On Jan. 9, the first dinner meeting of the new year of the Saginaw Valley Branch was held at the Michigan House in Bay City, Michigan at 6:45 p.m.

After dinner, the entire group was invited to a plant tour of the Bay City Division of the Electric Auto-Lite Company, which proved to be very interesting and informative.

The bulk of the tour consisted of the plastics 'casting' and anodizing departments. The plastics 'casting' processes used in the manufacture of automotive tail light 'glass' and electrical system housings such as distributor caps, etc. was described in detail by the congenial supervisors.

The anodizing process centered around one very large full automatic machine which was automatically loaded and unloaded, and had other automatic control features.

The members were greeted as they left the plant by a good old Michigan snow storm, which prevented many from returning home that night.

Charles Melekian
Recording Secretary

ST. JOSEPH VALLEY

Considering Electroplating Course

The Dec. 5 meeting was held at the L. H. Inn in Mishawaka, Ind. 44 members and guests attended the dinner and technical session.

Minutes of the November meeting were read and approved. President **Gene Roth** welcomed three new members into the Branch. Two new applications for membership were read and approved.

A lively discussion followed concerning the possibility of a course in electroplating. Response was very heartening. Questionnaires will be mailed to the membership to determine on what level the proposed course would be presented.

Ralph D. Wysong introduced the guest speaker, **Douglas Thomas,** of the General Motors Research Laboratories. Mr. Thomas is the present librarian of the Detroit Branch and has also been active in ASTM affairs. His topic was "Durability of Plating Coatings."

Not only has the neutral salt spray been responsible for many controversies but its limitations are such that a gap is left in corrosion evaluation. A good method of reporting degree of corrosion applies a number to the results obtained: A No. 5 being perfect with numbers ranging downward to 1 which is 70 per cent to total failure of base metal or plating failure. Slides were shown to clarify the rating system.

Surveys made of 10 separate parts on each automobile of 20,000 in service in all but one state, indicated that initiation of corrosion occurred in the first year of exposure. In 1951, Detroit cars were separated because of more severe conditions. It was decided that anything that would improve plating performance there, would prove beneficial all over the country.

The Index of Quality (a number obtained by adding the ratings of all parts of all cars tested divided by the total number) was found to decrease during the period of 1950 to 1953 due to the lack of nickel. In 1954, an upward trend again was experienced.

These surveys were felt to be of the post mortem type and a reliable, accelerated type of test must be developed. Because of the unreliability of the standard salt spray, the switch to the acetic acid modification appears to be an improvement.

Panels from Project 15 were shown and included both zinc die cast and steel with varying thicknesses of nickel in actual service as compared to those run for 192 hr in the acetic acid modified salt spray. The extend and the pitting type corrosion were similar in both cases.

The acetic acid salt spray is the standard 5 per cent neutral salt spray with acetic acid additions to a pH of 3.2. McMaster of General Motors is responsible for writing the ASTM specification. The new test

How to IMPROVE YOUR PLATING OPERATIONS with SEYMOUR BRIGHT NICKEL

TO OBTAIN THIS DEPOSIT — USE THIS SEYMOUR BRIGHT NICKEL PROCESS

	*Type	Solution	Active	Method	Deposit
BRIGHT	C	Warm	Yes	Still	Decorative
BRILLIANT	NC	Warm	Yes	Still Barrel	Decorative Specification
ULTRA BRILLIANT	CK	Warm	No	Still Barrel	Decorative Specification
NORMAL NICKEL	R	Cold	—	Barrel	Decorative
BLUISH TINT	NR	Cold	—	Barrel	Decorative
DEEPER BLUE	RS	Cold	—	Barrel	Decorative

(*) For best results use these solutions with SEYCAST 99% cast anodes. Write for SEYMOUR bulletins giving complete details.

SEYMOUR BRIGHT NICKEL PROCESSES efficiently deposit on steel and ferrous alloys, on brass and nonferrous alloys and on zinc-base alloys which have been previously copper-plated.

They give you these important features: —

- GREATER THROWING POWER to successfully plate deeply recessed articles.
- HIGH DUCTILITY (in all but the "CK" process) which permits further fabrication after plating.
- MINIMUM OF CONTROL with easy operation and freedom from hydrogen pitting.
- SAVINGS in time and money because active surfaces require no reactivation, cleaning or wiping before chrome plating.

THE SEYMOUR MANUFACTURING CO.
5 FRANKLIN STREET, SEYMOUR, CONNECTICUT

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 391.

is also to be adapted for anodized Aluminum coatings.

A system of grading the results of the degree of corrosion to yield a numerical value of performance index number is based on the same 1 to 5 corrosion scale. Inspections of panels are made every 24 hr of the 192 hr total exposure time. If a rating of 1 is reached before 24 hr have elapsed, the part is removed. Otherwise the rating numbers for each insertion are added, multiplied by 2.5 and the result is called the "performance index number." The number varies between 20 and 100 and by use of this method comparisons and trends may easily be determined.

Factors affecting the durability of electrodeposited coatings include:

1. Properties of the basis metal
2. Basis metal preparation
3. Plating solution
4. Properties of the deposit
5. Post plating treatments

Application of statistical methods have shown that eleven panels are required to be run to establish a given point. Mr. Thomas pointed out that there is yet much work to be done to correlate results in different cabinets. Mr. Thomas answered several questions that enhanced a well presented and very interesting paper.

Ritzenthaler Talks on Engineering Aspects of Plating

Forty-seven members and guests attended the Jan. 9 meeting at Russ' Restaurant in South Bend. President **Gene Roth** called on **Ralph D. Wysong**, third vice president of the National Society, to explain and clarify the functions of the Supreme Society and the various boards and committees.

A recap of the questionnaires concerning a course in electroplating to be offered in the area, showed that there is a large enough number interested to warrant presentation of such a course. President Roth appointed **Bill McDowell, Louis Ragne** and **Henry Meers** to make the necessary preparations.

The meeting was turned over to **Dr. Harold Weisner** who introduced the guest speaker, **Phil Ritzenthaler.** Mr. Ritzenthaler has been associated with plating for over 20 years and in 1945 established his own plating business where he has specialized in engineering applications of plated coatings. He has done much work for the AEC and is an active member of the Milwaukee Branch of AES, the ACS and Chicago's NAMF. His topic was "The Engineering Uses of Plated Coatings."

The functional properties of plating are concerned with physical properties of the film rather than the decorative aspects. These properties may be broken into the following uses:

Corrosion prevention
Salvage operations
Hardness & wear resistance
Bearings
Solderability
Stop-off for heat treatment
Conductivity improvement
Engineering electroforming

The specialty of heavy nickel plating (from 3 to 30 thousandths thick) is called "electrocladding" because the base metal properties are covered to the extent of assuming the properties of the coating itself.

In adequate thicknesses, nickel resists a great number of alkaline chemicals. It also has wide use in the food processing industry because of its good thermal properties when in vessel form. Another application is in the manufacture of plastics, especially of the polyvinyl chloride type where chromium cannot be used because of the release of hydrochloric acid during processing. Nickel cladding did much to further AEC work. It is one of the few metals that is resistant to the extremely corrosive uranyl hexafluoride.

In many salvage operations nickel is more practical than chromium because of its machinability. This requires an extremely high bond strength and there-

Tamms

NEW!

Soft amorphous type

MICRO-SILICA

with these special features

OIL ABSORPTION (G & C) ..... 36.4 to 40.3 LBS.
PH VALUE ..... 5.0 to 5.2
MOISTURE 5%

A NEW PROCESS SILICA

PARTICLE SIZE RANGE 1 TO 15 MICRONS
98% MINUS 10 MICRONS

New improved equipment assures highest quality and production control

WRITE TODAY FOR SAMPLES, PRICES AND SPECIFICATIONS

Dept. P

TAMMS INDUSTRIES, INC.
228 N. La Salle St., Chicago 1, Ill.

USE READER SERVICE CARD; INDICATE A 392.

★ IMPROVE PLATING AND ALKALINE DE-RUSTING
WITH PERIODIC-REVERSE UNITS

OF FINEST QUALITY

UPA

WRITE FOR INFORMATION

UNIT PROCESS ASSEMBLIES, INC.
61 East Fourth Street New York 3, N. Y.

USE READER SERVICE CARD; INDICATE A 393.

ECONOMICALLY REPLACES FULL-DISC BUFFS

LONG-LASTING, SOFT FLEXIBILITY for FASTER CUTTING and HIGHER COLOR

CENTERLESS PLEATED CLOTH BUFF

for more keys to GREATER BUFFING OUTPUT
See pages 326, 334, 337

AMERICAN BUFF COMPANY
2414 South LaSalle Street Chicago 16, Illinois

USE READER SERVICE CARD; INDICATE A 394.

fore required development of new cleaning methods that would consistently produce good bond.

Sulfamate nickel baths produce a low stressed deposit and through the use of addition agents yields harder deposits and reverses the stress to compressive from the normal tensile stress expected. Nickel phosphorus alloys may be heat-treated to Rc 60 and still remain comparatively ductile.

Ninety-three per cent lead, 7 per cent tin alloy plated over bronze are useful for break-in runs in both automotive and marine applications. The same alloy has been applied to stainless to act as an anti-galling film.

An alloy of 60 per cent tin/40 per cent lead is excellent for soldering and has the added advantage of being oxidation resistant for long periods.

Copper used as a heat treat stop-off must be very fine grained and dense. A minimum thickness of 0.001 is required. Tin and bronze are frequently used as nitride stop-offs.

Copper, cadmium, lead tin alloys and silver are plated to increase conductivity of a base metal—silver being the most efficient because all of its salts are conductors. Silver plated aluminum has a promising future along these lines, because of its low cost and light weight.

As a film resistant to high temperature oxidation chromium is best suited and finds much use in glass rolls and molds.

In electroforming engineering components, nickel is more often used than iron because of the many difficulties encountered in operating an iron bath for prolonged periods. Fabrication of many radar components, spray masks, embossing dies, plastic molds and foundry patterns is facilitated by this method.

Mr. Ritzenthaler showed engineering aspects of plating seldom encountered in the average plating room. He showed many slides of particularly difficult assignments that aided greatly in clarifying his very well presented paper. Mr. Ritzenthaler answered many questions from the floor and was accorded a standing vote of thanks at the meeting's end. The meeting was adjourned at 9:45 p.m.

Henry A. Meers
Secretary

SOUTHEASTERN

House Speaks on Barrel Plating

The Southeastern Branch held its regular monthly meeting Jan. 11 at the Belmont Steak House, Atlanta, Georgia, with **George Taylor** presiding. After a short order of business, and a juicy steak, **Mr. House,** vice president of sales, LaSalco, Inc., presented a talk and a motion picture on "What Happens in a Plating Barrel."

Robert H. Probert
Secretary-Treasurer

SPRINGFIELD

Biggest Meeting in Long Time Hears Gerry Lux

The Springfield Branch met at Blake's Restaurant, for the Jan. 28 meeting. President **Roger Heroux** opened the meeting and gave a brief report of the events and progress of the New England Regional Meeting Committees, of which Springfield is Host Branch, this year. President Heroux is chairman and he has two capable co-chairmen in Past President **Robert J. Girard** with four years' experience on these committees, and First Vice President **Charles F. Griffin Jr.** The meeting will be held on Saturday, April 27th, at the Hotel Statler in Hartford, Conn.

Springfield welcomed six new members into the fold.

After the Business Meeting, Librarian **Anthony Horta** introduced the speaker for the evening. He is no stranger to the Springfield Branch, having visited here three times in the past five years, each time on a different subject. This time, the subject was "Soak Cleaning—or—Some Fundamentals of Alkaline Cleaning." The speaker? None other than **Gerald "Gerry" A. Lux** of Oakite Products. He drew the biggest attendance Springfield has had in a couple of years. There were thirty-eight members and guests present, at the official count at the start of the business meeting.

Henry L. Heissfeld
Secretary

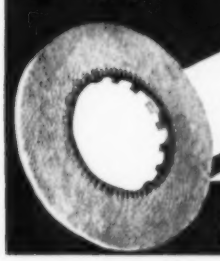
WANTED

Large capacity automatic plating equipment for both chrome and brass. Pay spot cash for complete setup.

•

PLATING
445 Broad Street Newark, New Jersey

FOR UNMATCHED DURABILITY AND FAST CUTTING
—free from scratching and fraying



CENTERLESS BIAS SISAL BUFF

for more keys to GREATER BUFFING OUTPUT

See pages 326, 334, 336

AMERICAN BUFF COMPANY
2414 South LaSalle Street Chicago 16, Illinois

WATERBURY

Successful Sustaining Members Night

The January meeting of the Waterbury Branch was held on the 17th at the Roger Smith-Elton Hotel. The dinner was held at 6:30 p.m. and the meeting started at 8 o'clock. **T. Voyda** presided. A Sustaining Members Night was held and was very successful. This event brought out the largest attendance of the year.

Ellsworth T. Candee, director of development and research, Lea Mfg. Co. acted as technical chairman. He spoke on the history of the research program of the AES and was very interesting. He later introduced **Dr. Henry B. Linford,** Professor of Chemical Engineering, Columbia University, who is the research director of Project No. 12, "The Cleaning and Preparation of Metals for Electroplating." He described the progress of the project and was very interesting to all.

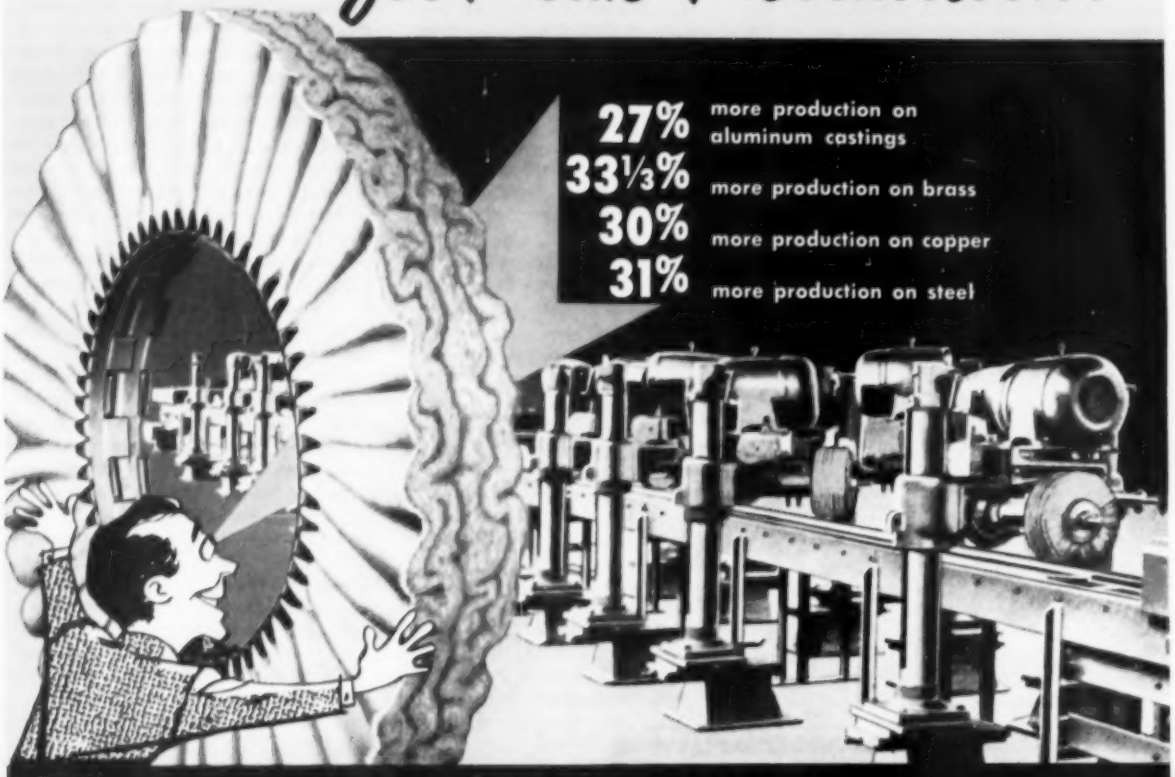
Mr. Candee then introduced **Clarence H. Sample,** International Nickel Co., a member of the Research Committee of the AES. Mr. Sample discussed projects No. 13-14-15, and described the progress of each one.

Dr. Earl J. Serfass, Professor of Chemical Engineering, Lehigh University, was scheduled to speak but was unable to attend because of illness.

The February business meeting will be held Thursday evening, February 7 at the home of **Francis T. Eddy,** Watertown, Conn.

Nicholas Topazio
Publicity Director

Take a Peek... *for Peak Production!*


27% more production on aluminum castings
33⅓% more production on brass
30% more production on copper
31% more production on steel

American's 7 Centerless Buffs
GUARANTEE 25% to 33⅓% MORE OUTPUT
on your present equipment!

DUPLICATE these CERTIFIED GAINS plant! Patented "Pre-Assembly"* permits assembling complete buffing heads (up to 100 sections each) *in advance . . . instant* replacement in a *single operation . . . faster* changeovers, *negligible* down-time.

COOLER RUNNING American Centerless Buffs permit *faster* machine speeds *without burning . . . longer* buff life, *fewer* changeovers, *increased output* of every man and machine!

*U.S. Pat. No. 2,599,785

Ask for a Demonstration!

Centerless **BIAS CLOTH BUFF**
Centerless **BIAS SISAL BUFF**
Centerless **UNIT SISAL BUFF**
Centerless (Sewed) **UNIT CLOTH BUFF**
Centerless (Unsewed) **UNIT CLOTH BUFF**
Centerless **OPEN BIAS SISAL BUFF**
Centerless **PLEATED CLOTH BUFF**

American Buff Company
2414 S. La Salle St., Chicago 16, Ill., CAlumet 5-1607

"For the job that's tough...use an American Buff!"

FUTURE MEETINGS

AES

March	28	**Research Committee,** Wade Park Hotel, Cleveland, Ohio.
March	30	**Fourth Annual Tri-State Regional Meeting,** French Lick-Sheraton Hotel, French Lick, Ind.
March	30	**Rockford Branch,** Annual Educational Session and Banquet, Faust Hotel, Rockford, Ill.
April	5	**Editorial Board,** National Headquarters, Newark, N. J.
April	26	**Executive Board,** National Headquarters, Newark, N. J.
April	27-28	**Executive Board,** Hotel Statler, New York, N. Y.
April	27	**18th Annual New England Regional Meeting,** Statler Hotel, Hartford, Conn.
April	27	**3rd Empire State Regional Meeting,** Grand Ballroom, Onondaga Hotel, Syracuse, New York.
April	27	**Milwaukee Branch,** Symposium, IMPORTANT ENGINEERING CONSIDERATION IN THE PLATING ROOM, Hotel Schroeder, Milwaukee, Wis.
May	4	**Boston Branch, 21st Annual Banquet and Technical Session,** Hotel Statler, Boston, Mass.
May	4	**Toronto Branch,** Annual Regional Meeting, Sheraton-Brock Hotel, Niagara Falls, Ontario, Canada
June	16-20	**44th AES Annual Convention,** Sheraton-Mount Royal Hotel, Montreal, Canada
May	19-22, 1958	**45th AES Annual Convention,** Sheraton-Gibson Hotel, Cincinnati, Ohio
June	14-18, 1959	**46th AES Annual Convention,** Detroit, Mich.

INTERSOCIETY

March	25-29	**American Society for Metals,** 10th Western Metal Exposition and Congress, Pan-Pacific Auditorium and Ambassador Hotel, Los Angeles
May	11	**Masters' Electroplating Association of New York,** 39th Annual Banquet, Plaza Hotel, New York, N. Y.
May	12-16	**Electrochemical Society,** Statler Hotel, Washington, D. C.
May	13-15	**12th Purdue Industrial Waste Conference,** Purdue Memorial Union Building, Purdue University, Lafayette, Ind.
June	11-13	**3rd Western Plant Maintenance Show,** Civic Auditorium, San Francisco, Calif.
June	16-17	**National Association of Metal Finishers,** Annual Convention, Sheraton-Mount Royal Hotel, Montreal, Canada
June	16-21	**American Society for Testing Materials,** Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.
November	4-8	**39th National Metal Exposition and Congress,** International Amphitheatre, Chicago, Ill.

BRANCH DIRECTORY CHANGES

CINCINNATI—Secretary: Address Change. David L. Kaplan, 817 Sabino Court, Cincinnati 31, Ohio.

HAMILTON—Secretary: Address Change. Bernard C. Leal, 16 Wilton St., Port Nelson, Ontario, Canada

See January 1957 Issue for Complete Branch Directory

AES DIRECTORY

OFFICERS

President . . . . . DR. SAMUEL HEIMAN
Philadelphia Rust Proof Company, Inc.
3227 Frankford Avenue, Philadelphia 34, Pa.

First Vice President . . . . . FRANCIS T. EDDY
Technicraft Laboratories, Inc.
Thomaston-Waterbury Road, Thomaston, Conn.

Second Vice President. . . . HERBERTH E. HEAD
Automotive Body Division
Chrysler Corporation
Detroit 31, Mich.

Third Vice President. . . . . . RALPH D. WYSONG
Studebaker-Packard Corp.
635 S. Main St., South Bend 27, Ind.

Past President . . . . . CLYDE KELLY
American Plating Company
808 Keo Way, Des Moines, Iowa

Executive Secretary . . . . . JOHN P. NICHOLS
445 Broad St., Newark 2, N. J.

RESEARCH COMMITTEE

Chairman . . . . . ARTHUR H. DU ROSE
Harshaw Chemical Company
1945 East 97th St.
Cleveland 6, Ohio

Vice Chairman, Research ROBERT A. EHRHARDT
Bell Telephone Laboratories, Inc.
Murray Hill, N. J.

Vice Chairman, Finance ARTHUR P. WRISBERG
Davies Supply and Manufacturing Company
32 Villa-Wood Lane
Webster Groves 19, Mo.

Secretary . . . . . JOHN P. NICHOLS
445 Broad Street, Newark 2, N. J.

THE
MASTERS' ELECTRO-PLATING ASSOCIATION
OF NEW YORK, INC.

59 EAST FOURTH STREET,
NEW YORK 3, NEW YORK

PROUDLY ANNOUNCES
ITS

39th ANNUAL BANQUET
AND
ENTERTAINMENT

SATURDAY, MAY ELEVENTH,
NINETEEN FIFTY SEVEN

PLAZA HOTEL
NEW YORK CITY

Subscription
$25.00 per person

Cocktails at 6:30
Dress optional

INDEX TO ADVERTISERS

This index is published as a service to our readers. We regret we cannot assure avoidance of inadvertent errors and omissions despite the many precautions exercised.

All-Brite Chemical Co. 326
Allied Industries Co. 319
Allied Research Products 251
Almco Div., Queen Stove 305
American Brass (Anaconda) 321
American Buff Co. 325, 326, 331, 336, 338
American Metals Co. 249
Atlantic Compound Co. 286

M. E. Baker Co. 284
Baker-Adamson Div. 301
Beam-Knodel Co. 334
Belke Mfg. Co. 291
Better Finishes & Coatings, Inc. 246
Buckhingham Products Co. 314

Chandeysson Electric Co. 253
Chemical Corp. 250
Chicago Rubber Co., Inc. 333
Cleveland Process Co. 322
Sigmund Cohn Mfg. Co. 307
Commercial Filters Corp. 308
Cowles Chemical Corp. 252

Davies Supply & Mfg. Co. 304
Diamond Alkali Co. 285
Diesel Chemical Co. 334
Duggan Masking Devices 326

Electrical Materials Co. 323
Enthone Inc. 227

General Electric 232, 233
Gray-I-Flo Corp. 299
Great Lakes Foundry Sand Co. 334
G. S. Plastics Co., The 317
Guaranteed Buff Co., Inc. 326
Frederick Gumm Chemical Co. Inc. 2nd Cover
Hanson-Van Winkle-Munning Co. 235, Back Cover
Harrison and Co. 326
Harshaw Chemical Co. 230
Haveg Industries Inc. 258
R. O. Hull & Co. 257

Illinois Water Treatment Co. 302
Industrial Filter & Pump Mfg. Co. 321
Infilco, Inc. 255
International Rectifier Corp. 236, 237

Klem Chemicals, Inc. 294
Kocour Co. 256
Joseph B. Kushner 334

Lasalco, Inc. 241
Charles F. L'Hommedieu & Sons 234
Lea Mfg. Co. 290A
Lea-Ronal Inc. 290B

MacDermid, Inc. 3rd Cover
Manhattan Rubber Div., Raybestos-Manhattan, Inc. 328
Mathieson, Olin, Chemicals Corp. 293
Meaker Co. 288
Metal & Thermit Corp. 313, 327
Michigan Buff Company 326
Michigan Chrome & Chemical Co. 245
Minnesota Mining & Mfg. Co. 239
Mutual Chemical Division, Allied Chemical & Dye Corp. 287

Northwest Chem. Co. 289
Norton Co. (Abrasives Div.) 283

Oakite Products, Inc. 300
Olin Mathieson Chemicals Corp. 293

Powers Regulator Co. 330
Pronat Division, Poor & Co. 332
Pyrosil, Inc. 238

Raybestos-Manhattan, Inc., Manhattan Rubber Div. 328
Richardson-Allen Corp. 247
Rosenthal 332

Sabin Metal Corp. 332
Schaffner Mfg. Co. 316, 318
E. E. Seeley Co., Inc. 332
Sellers Engineering Co. 243
Sel-Rex Corp. (Rectifier Div.) 342
Sethco Mfg. Co. 330
Seymour Mfg. Co. 335
Sparkler Mfg. Co. 240
Spraying Equipment Corp. 304
Stainless Steel Corp. of America 295
Stanley Chemical Co. 331
Frederic B. Stevens, Inc. 228
Storts Welding Co., Inc. 250
George A. Stutz Mfg. Co. 290
Sulphur Products Co., Inc. 330

Tamms Industries, Inc. 336
Tramer Industries, Inc. 303, 320
Trerice, H. O., Co. 298
True Brite Chemical Products Co. 244

U. S. Stoneware 309
Udylite Corp. 258A, B, C, D
Unit Process Assemblies, Inc. 292, 336
Univertical Foundry & Machine Co. 332

Vanton Pump & Equipment Co. 259

Wagner Brothers Inc. 341
Wolverine Metal Co. 329
Wyandotte Chemicals Corp. 311

Zialite Corporation 319

WAGNER ISO-BRITE COPPER . . .

"The efficiency of your new Iso-Brite Copper bath will enable us to put a $7500 'semi' to work on other jobs. We get a deposit of .0005" in a 15 minute cycle and could easily get .0006" to .0008" if required. Iso-Brite needs less maintenance than any bath within our experience." (Robert Hilfinger, Pres. Hilfinger Corp. to Jos. R. Wagner.)

doubles

Die cast automotive grill part ready for nickel and chrome.

SEMI-AUTOMATIC PLATING!

CONVERSION TO ISO-BRITE ELIMINATES ONE MACHINE . . .

The record at Hilfinger Corp., Toledo, Ohio, tells a simple story. This big, 115,000 sq. ft. die casting plant with a 200-man plating department originally required two semi-automatic plating machines for plating copper before nickel and chrome on large automotive die castings. New Wagner Iso-Brite Copper bath was installed eight months ago in one tank, replacing a leading proprietary copper bath, both machines being operated by a single generator. Excessive burning of the competitive plate resulted. The single machine charged with Wagner Iso-Brite Copper now turns out Hilfinger's entire production requirement to the customer's specification, permitting the surplus semi-automatic to be devoted to other production.

If reducing finishing costs is of interest to you, consider these reasons why this new Wagner-processed chemical is making records everywhere:

Wagner Iso-Brite Copper offers

1. Ease of control
2. High anode efficiency—copper cyanide additions virtually eliminated
3. Much heavier plate
4. Fine grained, dense, ductile, fully bright
5. Freedom from roughness
6. Wide operating range—temperature 135-165°; up to 60 amperes per square foot
7. High tolerance of organic contamination

Wire, phone or write for Bulletin 70.2 for full technical information on Iso-Brite Copper and the Wagner cadmium and zinc brighteners and chromate finishes. Please pass this advertisement along to your purchasing agent or plating superintendent. The Wagner man in your area will assist you with any plating problem.

425 MIDLAND AVE., DETROIT 3, MICHIGAN

CHICAGO • CINCINNATI • CLEVELAND • INDIANAPOLIS • NEW YORK • ROCHESTER • GRAND RAPIDS

Wagner BROTHERS INC.

Meet the Sel-Rex Family of Industrial Precious Metals...

BRIGHT GOLD

A mirror-bright finish directly from the bath — more dense and twice as hard as ordinary gold. One gram does the job of two grams of conventional 24 K Gold.

Patent pending

SILVREX BRIGHT SILVER PROCESS

Crystal-clear solution that produces mirror-bright deposits. Economical to use—stable one-addition agent brightener. Easiest to control.

Patented

BRIGHT RHODIUM

Brilliant, fine-grained, non-tarnishing deposits. Best for all decorative applications. Available in phosphate or sulphate formulations.

RHODEX

The only rhodium electroplating process that yields compressively stressed deposits. Eliminates costly rejects due to cracking or peeling. RHODEX will not increase fatigue failures of base metal as ordinary rhodium electroplate does.

Patent pending

PUR-A-SALTS

Barium double metal cyanides. Restores contaminated cyanide plating baths to full, trouble-free production —"knocks out" carbonates, sulphates and chromates. Minimizes waste disposal problems.

Patented

SILVER SOL-U-SALT

Non-dusting — safest and easiest to use. Cost-cutting — adds directly to the bath without filtering. Won't upset silver to cyanide ratio.

Sel-Rex plating engineers are constantly searching for precious metal processes that will provide industry with the inherent characteristics of a particular precious metal but eliminating the weaknesses. The Sel-Rex Family of Precious Metals Processes to date are used world-wide, giving the electronic and electrical industries and product design engineers new and better plating tools.

Complete installation and servicing on all precious metals processes.

Jet Plater

A complete versatile, small-volume plating unit for precious metal plating. Incorporates built-in rectifier with timer and other automatic features.

Sel-Rex®

Precious Metals Division

SEL-REX CORPORATION

155 Manchester Place, Newark 4, N. J.

Manufacturers of Exclusive Precious Metals Processes, Metallic Power Rectifiers, Airborne Power Equipment, Liquid Clarification Filters, Metal Finishing Equipment and Supplies.

PRODUCE BRIGHTER, MORE UNIFORM PLATED SURFACES WITH

METEX M-629

A New Dry Replacement Salt
For Acid-dipping All Base Metals

Improved bond and brightness . . . lower cost than 50% muriatic acids* . . . increased lustre with no increase in plating thickness—these are only a few of the many advantages of MacDermid's newest product—METEX M-629.

And there are other plusses, too! Because M-629 is dry-packed in fibre drums, handling and storage is easier and safer than liquid acids. No fuming . . . no protective equipment needed.

Write today for more detailed information (including "cost saving" case histories). Let a MacDermid representative show you the newest, most economical, most efficient way to handle your acid-dipping problems.

*Also effective in lower concentration for improving lustre of plated zinc-base die castings, copper and brass.

MAC DERMID
★ *Incorporated* ★
WATERBURY 20, CONNECTICUT

COMPLETE SUPPLIERS TO THE METAL FINISHING INDUSTRY

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 399.

From **H-VW-M** comes

The New Mercil-Type belt driven

PLATING BARREL

MINIMUM MAINTENANCE
— New design cuts down-time, saves on replacements.

MAXIMUM VERSATILITY
—Plates in all solutions, rotates in any Mercil tank.

BUILT-IN QUALITY
—Long life assured by job-tested features.

Check how these **H-VW-M** features bring you greater economy.

- Belt-driven cylinder offers total submersion in all barrel plating solutions. Shows up to 16% savings over gear-driven unit.
- Standard V-cogged belts—replacements from any belt supplier at nominal price of approximately $6.50.
- Belt replacement contrasted to gear replacement offers simplicity, speed and lower replacement parts cost.
- No bearings in solution. Corrosion-proof Plastisol coated guide arms. Stainless steel pins lock pulleys for positive rotation.
- Motor available hanger mounted, or direct drive—allowing complete interchangeability of barrels on all Mercil-type equipment.
- Three types of tough cylinder *materials*—Plexiglas, Melamine and Tempron. Flexible contacts carry full 1000 amp power for faster plating.

All plating plants, and particularly job plating shops, will do more profitable plating with any one of the twelve new Mercil-type belt driven barrels. Get *more* production from your present tanks —*cut* maintenance time to a minimum—save on all belt replacements.
Write for catalog—today.

Hanson-Van Winkle-Munning Company,
Matawan, New Jersey.
Offices in principal cities

H-VW-M

Industry's Workshop for the Finest in Plating, Anodizing, and Polishing Processes • Equipment • Supplies

PLATEMANSHIP —Your H-VW-M combination—of the most modern testing and development laboratory—of over 80 years experience in every phase of plating and polishing—of a complete equipment, process and supply line for every need.

FOR FURTHER INFORMATION, USE READER SERVICE CARD: INDICATE B 302.